SMOKING FISH AT HOME

AGRICULTURAL EXTENSION

UNIVERSITY OF CALIFORNIA

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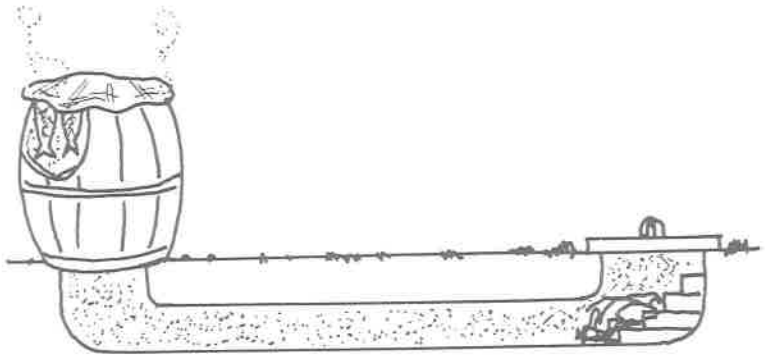
To give a sheen to the surface of the smoked fish, rub with a vegetable oil after the smoking is completed. Much practice and experience are needed to prepare a satisfactory light-smoked and salted fish. The length of brining and smoking periods to suit one's taste are learned mainly through practical trials. Commercially prepared fish are often smoked the first 12 to 24 hours in a well-ventilated smoke chamber so that a drier smoke will be obtained. This dries the fish surfaces to give them the desired shiny film. This may then be followed by a day or two of smoking with dampers partially closed to produce a more moist smoke that will be absorbed by the fish.



SMOKING FISH AT HOME

The fisherman's catch, if properly preserved, can be a welcome addition to family meals over a period of several weeks or months. There are several ways to preserve fish that you don't plan to eat right away.

If no ice or refrigeration is available, corn fish (salt lightly) soon after it is caught for temporary storage of about 24 hours. Salted and smoked fish keep for a longer time, depending on the amount and kind of smoking and salting. You may also can or freeze fish.

Since many people prefer the flavor of lightly smoked fish, it is often smoked and then canned or frozen for longer storage. See *Canning and Freezing Fish at Home*, HXT–3, for directions.

CORNING

This is a method of temporarily preserving fish until ice or refrigeration is available.

1. Bleed fish as soon as caught by pulling out the gills completely.
2. Clean fish as soon as possible; scrape out all traces of blood and intestinal material. Wash the body cavity thoroughly.
3. Rub the belly cavity well with a mixture of table salt and pepper (1 tablespoon pepper to 1 cup salt). Use about 1 tablespoon of the mixture for a ¾-pound fish. Dust a small amount on the skin side.
4. Place fish in a basket or box. Cover the container with several thicknesses of well-moistened burlap and keep it damp throughout the storage period. Do not let the burlap rest on the fish; there must be an air space above them.

The fish should remain in good condition for at least 24 hours. Rinse thoroughly before cooking or further processing.

SMOKING

Fish is smoked by drying it slowly over a smoldering fire. Salt helps to preserve the fish; the wood smoke adds flavor and color.

There are two general methods of smoking fish: **hot smoking** or barbecuing, and **cold smoking**.

Hot Smoking — Fish prepared in this way are partially or wholly cooked and will keep for only a short time.

1. Split the fish along the back, just above the backbone so it will be open in one piece, leaving the belly solid.
2. To scrape out all viscera, blood, and membrane, make an additional cut under the backbone.
3. For larger fish, cut out the front half of the backbone.
4. Wash thoroughly. Soak for 30 minutes in a brine made of ½ cup salt to 1 quart water.
5. Prepare a brine of: 2 pounds salt, 1 pound sugar, 1 ounce saltpeter, 1 ounce crushed black peppers, and 1 ounce crushed bay leaves to 1 gallon of water. (Spices may vary.)
6. Soak fish in brine for 2 to 4 hours. The length of time will vary with the size and thickness of the fish, the amount of fat, and preference for light or heavily cured fish.
7. Rinse fish in fresh water and hang outdoors in a cool, shady, and breezy place to dry for about 3 hours. A thin shiny skin, or pellicle, should form on the surface.
8. Place fish in smokehouse about 3 or 4 feet from fire. Keep fire low and smoldering for the first 8 hours. Temperature should not be higher than 90° F.
9. Build up a dense smoke and smoke for 4 hours. Increase the fire until the temperature is between 130° and 150° F. Cure at this temperature for 2 to 3 hours, or until the fish have a glossy, brown surface.
10. Cool fish for 2 to 3 hours. For a more attractive appearance, brush fish lightly with vegetable oil while warm.
11. Wrap each fish in heavy waxed paper and store in a cool dry place.

LOX (Lightly Salted Smoked Salmon)

Fish smoked following these directions require refrigeration. They will keep in the refrigerator for 2 to 3 weeks.

Use only fresh fish that have been caught recently and held under good storage condition. Fish which have been handled carelessly or stored under improper conditions will not produce a satisfactory finished product. Bruised or broken or otherwise damaged flesh should be avoided.

1. Butcher by removing head, fins, tail, and viscera. Remove the kidney (the dark red mass along the backbone). Wash body cavity with running cold water, removing as much blood as possible.
2. Split fish lengthwise along backbone; remove the backbone to produce two fillets or boneless sides.
3. Score the skin by making small cuts every 3 or 4 inches to allow salt penetration. (Do not cut into red flesh.)
4. Allow the fillets to stand in brine in a cool place overnight or 16 to 18 hours. A suggested brine is 6 to 10 ounces of salt (¾ to 1¼ cups) per gallon of water. The length of immersion time and the salt concentration can be adjusted to give the desired saltiness.
5. Rinse fillets in fresh cold water for 5 to 10 minutes.
6. Allow the surfaces to drain, or press dry with a cloth.
7. Use a dry nonresinous wood such as alder, maple, or oak. Smoke at 70°–80° F for 1 to 3 days, or until a satisfactory smoke is obtained. A temperature higher than 80° F should not be used since it will cook the fish.
8. When sufficiently smoked, remove fish from smoking room and keep under refrigeration. At household refrigeration temperatures, this smoked salmon will keep for 2 to 3 weeks. It may be kept longer when frozen.

8. Fasten each fish to the forked end of a stick about 4 to 5 feet in length. Thrust the other end of the stick into the ground so that it hangs over the bed of coals at an angle. The sticks should be far enough apart so that the fish do not touch each other.
9. Erect a tripod of poles above the fish sticks, and lay a thick thatching of green boughs and grass on this. Leave a hole in the thatching near the ground.
10. Place green wood on the coals and build up a dense smoke; cover the hole in the thatching. Place more green wood on the fire as needed.

    Smoke the fish for 6 to 18 hours, depending on the size and degree of smoke-cure desired.
11. Cool fish. Wrap and store in a cool, dry place.

A TEMPORARY BARREL SMOKEHOUSE

This smokehouse is usable for small lots of fish.

1. Knock the ends out of a large barrel.
2. Dig a hole or pit in the ground about 2 feet deep and a little narrower than the diameter of the barrel. Set the barrel over the hole.
3. Nail wooden strips inside the barrel on two sides, a few inches below the top.
4. Hang fish on sticks cut to fit inside the barrel. The sticks should rest on the strips on either side of the barrel.
5. Place a loose-fitting cover on top of the barrel.
6. Dig a hole to serve as fire pit on the side of the barrel from which the prevailing winds come. Dig the fire pit about 12 feet from the smokehouse pit and connect the two holes by a covered trench; fit the fire pit with a cover. This serves for draft when the lid is partly raised.

Cold Smoking — Longer periods of brining and smoking at low temperatures increase the length of time the fish will keep.

1. Clean fish promptly. Small fish should be split along the back to lie flat in a single piece, leaving the belly portion uncut.

    Larger fish such as salmon, steelhead, yellowtail can be cut in half and the backbone removed. The two sides with skin on the outer surface of each may be cut into smaller pieces for easier handling.

    All traces of blood, black skin, and viscera must be removed. Pay special attention to the area just under the backbone. If the head is removed, leave the hard bony plate just below the gills, since it will be needed to carry the weight when the fish is smoking.

    If sides are left whole, score flesh lengthwise from head to tail with cuts ¼ inch deep and 1 inch apart.
2. Wash fish thoroughly. Soak for at least 30 minutes in a brine of 1 cup salt to 1 gallon of water.
3. Rinse in fresh water and drain.
4. **For small fish:** Drop each fish in a shallow box of fine salt and dredge thoroughly. Pick fish up with as much salt as will cling to the body and pack in even layers in a box or tub. A small amount of salt may be scattered between each layer.

    For larger fish: Place ¼-inch layer of salt in the bottom of an earthenware jar or hardwood keg. Place a layer of fish, skin side down, over the salt. Cover the fish with ¼-inch layer of salt. Alternate layers of fish and salt. Place the last layer of fish skin side up and cover well with salt. Cover the container with a cloth or board.
5. Leave small fish in salt from 1 to 12 hours; larger fish up to 3 days, depending upon weather, size of fish, fatness, and length of time fish are to be preserved before use. A brine will form in the bottom of the container.
6. Take fish from salt and rinse thoroughly. Scrub off all visible salt and any waste.

7. Hang small fish to dry outdoors in the shade. (Larger fish may be placed directly in the smokehouse.) An electric fan may be used if there is not much breeze. Dry until a thin skin, or pellicle, forms on the surface (about 3 hours).

8. Start a low, smoldering fire an hour or two before the fish are placed in the smokehouse. The fire must not give off too much smoke during the first 8 to 12 hours if the total cure is 24 hours, or for the first 24 hours if the cure is longer. The temperature in the smokehouse should be kept at about 80° F; it should not go above 90° F.

   If a thermometer is not available, the temperature may be tested by hand. If the air in the smokehouse feels distinctly warm, the temperature is too high.

9. Hang the fish or lay on wire shelves in the smokehouse. Large fish should be at least 8 feet from the fire.

   When the first part of the smoking is ended, build up a dense smoke and maintain it for the balance of the cure. Use a smoldering, smoking fire of nonresinous wood, such as oak, apple, or alder. Do not allow the fish to become so hot that it drips fat.

   Keep the fire burning steadily. If the fire should go out, rebuild and continue smoking the fish as soon as possible. Turn the fish occasionally.

   Smoke the fish until it is coated evenly with a brown color. Small fish that are to be kept about 2 weeks may be ready in 24 hours. Salmon and other large fish will require 3 to 4 days and nights of steady smoking. For a longer storage period, smoke all fish for 5 days or more.

General rules for tending the fire

Keep fire low and steady. Do not allow fire to die out at night. Do not build up fire to last the night; it must be tended regularly during the night.

10. Store by wrapping in paper and hanging in a dry, dark, cool place.

11. Examine occasionally for mold. If mold starts, remove with a clean cloth and resmoke the fish.

12. Before using, freshen the fish by breaking it into sections and soaking overnight in cold water. If still too salty, freshen in a second water.

13. If the fish has been sufficiently cured, it will keep for several months.

SMOKING METHOD FOR SPORTSMEN

This method may be used for medium-sized fish; it is particularly suitable for trout, pike, and pickerel. The fish will keep from 2 to 4 weeks.

1. Cut off heads and gut fish. Make a cut above the backbone almost to the tail. Make another cut under the backbone and break off backbone, leaving not more than one-fifth of the tail section uncut. The fish should lie flat in one piece.

2. Score flesh lengthwise from head to tail, with cuts ¼ inch deep and 1 inch apart.

3. Wash fish thoroughly and wipe dry.

4. Rub fish inside and out with a mixture of 1 ounce (¼ cup) pepper to 1 pound (1½ cups) salt.

5. Store in a cool place overnight. In the morning, rinse thoroughly.

6. Fasten 2 or 3 thin, flat wooden sticks across the back to keep the fish spread open. Hang fish in a breezy place until surface moisture dries and a thin skin forms on the surface (about 3 hours).

7. Dig a shallow fire pit, about 3 feet in diameter. Start the fire far enough ahead to have a bed of red coals by the time the fish have air dried.

   Hardwood is best for fuel, but any nonresinous wood, such as maple, beech, birch, or alder can be used.

PRESERVING SHELLED WALNUTS OR OTHER DRIED FOOD PRODUCTS USING DRY ICE

Marston H. Kimball, Agriculturist Emeritus.
Revised by Russell H. Gripp, Farm Advisor, Shasta County.

Walnut kernels keep best in a tight container in which all the oxygen or air has been replaced with carbon dioxide gas. This method of preserving is simple and the cost is minor.

INSECTS

Although in-shell walnuts stored at home won't turn rancid for about 6 months, insects that invade cereal, grain, or other dry products also may infest nutmeats.

RANCIDITY

You may shell your walnuts in the fall to protect them from insects, but they will begin to turn rancid in 6 weeks to 2 months at room temperature (72° F) when in the presence of air. They will keep for 6 to 12 months in your refrigerator. A home freezer will keep nuts from one season to the next (12 to 18 months), but even a storage temperature of -5° F will not prevent walnut oil from turning rancid.

NOTE CAREFULLY!!

Some cookbooks and reference sources may advise preserving walnuts by heating them in the oven, canning them by the hot-water-bath method, or blanching them for a short time. None of these methods is satisfactory because exposure to temperatures above 110° F starts the breakdown of walnut oil, which then turns rancid in a few weeks. Walnuts are seldom found in retail supplies of roasted mixed nuts.

THE CARBON DIOXIDE METHOD

Walnuts preserved in carbon dioxide are safe to eat, and the gas is nonpoisonous under these conditions. The kernels are not exposed to high temperatures in the preserving process. The lack of oxygen prevents rancidity. Since adult insects and worms must have oxygen to live, they are not a storage problem.

DIRECTIONS FOR PRESERVING

These are the simple steps for preserving walnuts in carbon dioxide:

- Shell the walnuts, and sort and grade the kernels. Discard those with evident mold or insect damage. Nuts with off-color heat injury (nonrancid) may be used immediately, as may water- or bleach-stained meats.

- Store dried walnuts meats. You may check suitable dryness by breaking halves or quarters after shelling. A plump-dried kernel is brittle and will break like a fresh crisp cracker. When the packing membrane between the two halves will break clean, the nuts have reached a suitable level of moisture for storage. If the membrane bends, the nuts are not dry enough for storage. If the kernels are moist, spread them out in a thin layer—not in the sun—until they are dry and brittle. The drier they are when you begin preserving, the better their flavor will be when you open the jar later.

(Over)

- Purchase some dry ice (solid carbon dioxide) for a low cost from an ice cream store or from companies specializing in "carbonic ice" (see classified section of the telephone book).

  CAUTION: Never handle dry ice with your bare hands — it will freeze the skin quickly. (-80° C = -112° F)

- Line up your storage jars and put a single layer of kernels in the bottom of each.

- Cut the dry ice into cubes with a hand wood saw. A 5-pound dry ice slab, 10" x 10" x 1", will make 100 one-inch cubes. If you're using quart jars, use a full 1-inch cube in each; use 1/2 cubic inch in pint jars, and 2 cubic inches in 2-quart jars.

- Using metal tongs, put a dry ice cube on a 1-inch layer of walnuts in the jars. Be sure the cube is near the side of the jar so you can see it after the jar if filled with walnuts. Don't place the dry ice against the glass—it may crack the jar.

- Fill the jars with kernels. Shake the jars down to get in as many nuts as possible. A quart jar will hold 12 to 14 ounces.

- Put on the lids and screw them down until they begin to tighten. Then turn them back until they are slightly loose.

  ANOTHER WORD OF CAUTION: Never seal the jars until all the dry ice has disappeared. Lids must be loose to allow air, replaced by the heavier carbon dioxide gas, to escape. When 1 cubic inch of dry ice vaporizes, it makes 12 to 14 quarts of carbon dioxide gas. If the jar is tightly sealed, the pressure builds up to between 200 and 250 pounds per square inch. Result: THE JAR WILL EXPLODE. But if you allow the air and excess gas to escape first, there is no danger of explosion.

- Let the jars stand undisturbed until all the dry ice has disappeared.

- Now it is safe to screw the lids down tightly.

- Store the jars in a cool room (50° to 80° F) or other suitable storeroom.

PRESERVING IN CANS

You may prefer to use airtight cans rather than jars for preserving walnuts. Use 1 cubic inch of dry ice for each quart capacity. Punch a 1/16-inch hole in the lid of the can. Cover the bottom of the can with walnuts, put in the dry ice, fill the can, and seal the lid in place. The air and excess gas will escape through the 1/16-inch hole. After an hour or so, put a drop of water over the hole. If the water bubbles, gas is still coming out. When the bubbling stops, seal the hole with hot solder, nonporous plastic adhesive tape, or sealing wax, and the walnuts are ready for storing.

The carbon dioxide method is suitable for preserving many other dry products, including beans, peas, or corn.

Other helpful publications:

WALNUT DRYING ON A SMALL SCALE, OSA #182

WALNUT BLEACHING ON A SMALL SCALE, OSA # 83

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OSA #194

NUTS - and Ways to Use Them

When you buy nuts in the shell, look for those that are clean and free from scars, cracks, or holes. The kernel does not rattle in a well-filled nut.

When you buy shelled nuts, look for kernels that are 1) plump and meaty, for full flavor and freshness, 2) crisp and brittle--limp, rubbery, shriveled kernels denote staleness, 3) uniform in size and color, if used as a garnish.

FROM ONE POUND OF NUTS IN SHELL

Nuts	Pounds of Kernels	Cups of Kernels
Almonds	1/2	1 1/2
Walnuts (black)	1/4	1
Brazil nuts	1/2	1 1/2
Filberts	1/2	1 1/3
Peanuts	2/3	2 1/8
Pecans	1/2 halves and chopped	2 1/4 halves 2 chopped
Walnuts	Approx. 1/2 halves and chopped	2 halves 1 1/3 chopped

FROM ONE POUND OF SHELLED NUTS

Nuts	Cups of Kernels
Almonds	3 (1 cup, chopped)
Black walnuts	4
Brazil nuts	3 1/4
Filberts	3 1/3
Peanuts	3 1/4
Pecans	4 1/4 halves 3 3/4 chopped
Walnuts	4 1/2 halves 3 1/2 chopped

BLANCHING

Only nuts with smooth surfaces can be blanched satisfactorily. In most preparations the skins add flavor, and blanching is unnecessary.

Almonds -- Cover kernels with water, heat to boiling, drain, and slip off the skins by pinching the almonds with the thumb and forefinger. Dry on absorbent paper or cloth, or in an oven at very low heat.

Brazil nuts -- Using a stainless steel, iron, or enamelware kettle (not aluminum), make a lye solution of 2 level tablespoons of granulated lye to 1 gallon of water. Heat to boiling, add the nut kernels and let stand until the skins loosen, about 1 to 2 minutes. Rinse thoroughly and remove the skins while the kernels are still warm. Wash thoroughly in cold water and dry overnight. The blanched nuts may be polished with a soft cloth.

Dispose of the lye solution as soon as the blanching is finished. Carefully pour the solution down the sink drain and rinse the sink with large amounts of cold water. Or, dispose of the solution in the toilet and flush several times.

Filberts -- Spread the shelled nuts in a shallow pan and toast them in a very slow oven (275°F) until the skins crack--about 20 minutes. While the kernels are still hot, rub them with a rough cloth to remove the skins.

Filberts also may be blanched, following the directions for blanching Brazil nuts.

(over)

In this publication, Christine Groppe, Extension Nutritionist, has combined OSA #134 "Preparing and Storing Edible Nuts" and OSA #135 "Some Uses for Edible Nuts" written by Marion T. Tate, former Extension Nutrition Technician.

ONE-SHEET ANSWERS
FARM ADVISOR HOME ADVISOR 4-H WORK
UNIVERSITY OF CALIFORNIA AGRICULTURAL EXTENSION SERVICE

SHELLING

Chestnuts -- Cut a gash on the flat side of the shell. Place chestnuts in boiling water to cover and boil for 15 minutes. Cool enough to handle, but remove shell and brown skin while nuts are still hot.

Or, gash, and then heat in moderate oven (375°F) for about 15 minutes, and remove shells and skin with a sharp knife.

Pecans -- Shells vary from very thin to thick and hard. The hard-shelled varieties are easier to crack if they are moistened first.

To do this, pour boiling water over the nuts; soak them for 15 to 30 minutes, depending on the thickness of the shell. Drain and crack. Or, soak overnight in warm water, or spread nuts between several layers of damp toweling and leave overnight.

If the kernels seem limp or damp, restore crispness by drying the kernels on a rack in a warm oven (200°F) for 2 hours, with the oven door partly open.

Walnuts -- To obtain perfect halves if a good nutcracker is not available, place walnut on its flat end, holding it by the seam. Strike with a hammer on the pointed end, using a sharp but bouncing blow.

TOASTED NUTS

Spread shelled nuts, blanched or unblanched, in a shallow pan. Heat in a slow oven, 300°F, for 25 to 30 minutes.

SUGARED, SLICED NUTS
(usually almonds or walnuts)

Use blanched almonds, freshly blanched and still warm, and other nuts unblanched.

Slice nuts into thin pieces, or chop into small pieces. If nuts shatter badly when sliced, soak them in warm water for a few minutes, then drain and slice.

Moisten slightly with a fine spray of water. Drain if necessary. Roll in fine-grained granulated sugar or in powdered sugar.

Spread nuts on a fine screen. Sift out excess sugar. Leave nuts on screen to dry for several days at room temperature. Store in a sealed jar.

These nuts may be used in candies, frostings, fillings, cookies, and as toppings for frostings, sundaes, or dessert salads.

ROASTED AND SALTED NUTS

Spread shelled nuts, blanched or unblanched, in a shallow pan. Add from 1 teaspoon to 1 tablespoon of oil, butter, or margarine per cup of nuts. Heat in a slow oven, 300°F, for 25 to 30 minutes. Stir frequently.

Spread on absorbent paper to cool. For salted nuts, sprinkle with salt while hot.

Or, proceed as above, but heat in a heavy skillet over low heat, stirring until hot.

Avoid overheating pecans, in particular, since the kernels darken after being removed from the fat.

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BE SAFE

Because there can be mistakes in home canning, look at each jar of home-canned food very carefully before using it. Be sure the seal is tight.

If you think the jar doesn't look right, if there is mold or any sign of spoiling, don't taste the food. If you do not save it for a health officer, get rid of the jar of fruit.

If you think anyone has eaten spoiled food, call a doctor at once. Call your health department. If you think the food is spoiled more than from mold, save the food in the jar, if possible. Handle the jar with gloves, or with a cloth. Boil the gloves or cloth. Do not put the jar where any person or animal can touch it.

Be careful how you throw the food away. But throw away any jar of canned food that doesn't look or smell right. It's cheaper than being sick. Do not put the jar of food where any person or animal might eat it.

If you have a flush toilet, empty the jar of food in it, and flush the toilet several times. Do not put your hands to your face. Boil the jar and lid in boiling water with 3 to 4 tablespoons of strong soap powder. Boil at least 30 minutes.

If you do not have a flush toilet, empty the spoiled food into an old pan or pail. Put the jar and lid into the pan. Cover the jar and food with water. Add 3 to 4 tablespoons of strong soap powder. Boil at least 30 minutes.

Do not use the jar or lid again. Throw them away after they have been boiled.

Clean your hands and everything that has touched the jar of food, with laundry bleach. Use 4 parts water to 1 part bleach. Then wash your hands and all utensils very carefully with soap and water.

MAKING PICKLES, RELISHES, AND CHUTNEYS

Quickly, Easily, and Safely

University of California

Agricultural Extension Service

Pub. HXT – 13

The authors are Helen D. Ullrich, former Extension Nutritionist, and Marion T. Tate, former Laboratory Technician. *They wish to acknowledge the aid of Hilda Faust, Extension Nutritionist Emeritus, Reese H. Vaughn and George K. York, Department of Food Science and Technology, University of California, Davis, who acted in advisory capacities.*

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AUGUST 1965

INDEX OF RECIPES

WHAT WENT WRONG?

PROBLEM	REASONS
Soft, slippery pickle	Usually means acid is too low and pickle is spoiling, nothing will firm this pickle
	Vinegar solution too weak
	Cooked too long or at too high temperature
	Not covered with liquid
	Not heated enough to destroy spoilage organisms
	Jars not sealed airtight while boiling hot
	Stored in a warm place
Hollow pickles	Faulty growing conditions
	Wrong variety of cucumber
	Stood too long between gathering and pickling
	Gaseous type spoilage
Shriveled, tough pickles	Too heavy sirup
	Too strong brine or vinegar solution
	Picked cucumbers stood too long before pickling
	Fruit cooked too quickly in strong sugar or vinegar solution, not allowed to plump up
Darkened pickles	Corrosion with metal lids
	Iron in utensils or water
	Used ground spices
	Used too much spice
	Packed whole spices with pickles
Green garlic	Not fully mature or thoroughly dry

Pickles, Relishes and Chutneys

Pickles and relishes give variety in color, texture and flavor that enhances other foods in a meal. Most pickles and relishes have very little nutritive value but a great deal of taste satisfaction. There are satisfactions from making your own pickles in addition to the tastiness.

The pickles and relishes included in this circular require only a short period of preparation. Vinegar, which preserves the pickles, replaces the acid formed by the fermentation of vegetables in the long term brining and curing process. In this way pickles are made in a day rather than by the long, laborious process of soaking vegetables in brine for two weeks. The resulting pickles may not be quite as crisp, but have a similar flavor and color.

The relishes, pickled fruit and chutneys included in this circular are also pickled products which can be made easily and will add zest to a meal. The chutneys have a sweet-sour flavor which adds sophistication to the meal.

USE THE RIGHT EQUIPMENT

- Use large enough kettle to be sure the ingredients will not boil over.
- The utensils used for pickles should be aluminum, stainless steel, enamel ware or glass. Copper utensils may turn pickles a peculiar shade of green; iron may turn them black.
- The action of acid or salt with galvanized utensils may develop a toxic substance which is poisonous.
- Select glass jars for pickling as carefully as you would for canning. Discard jars with chips, cracks, or warped tops. Pint and half-pint jars are recommended for pickles that are to be processed.

- Glass lids are preferable for preserving pickles or relishes as the acid has a tendency to corrode metal lids. However, metal type lids may be used if the pickles are kept no longer than six months to a year. When the lid starts to corrode, the liquid at the top of the jar may turn dark. Continued corrosion may actually pit the lid so that the pickles are no longer sealed. Do not use a porcelain-lined zinc screw cap.
- When glass lids are used, be sure to use new rubber rings of the right size for your jars. If metal lids are used, they should also be new.

USE THE RIGHT INGREDIENTS

- Choose food that is firm, fresh and free from bruises or blemishes. Preserve as soon after picking as possible, within 24 hours is a good rule.
- Fruit should be slightly underripe. It will hold its shape better.
- Use small or medium cucumbers of the varieties used for pickling. If cucumbers are mature, peel them.
- Thoroughly wash all fruits and vegetables to remove dirt which could start bacterial action.
- Pure granulated salt (sack salt) is best for pickling, but table salt can be used. Table salt usually has chemicals added to prevent lumping. These may interfere with the best results by causing some cloudiness and darkening of the pickles.
- Use a good, clear standard vinegar, free from sediment, with 4 to 6% acetic acid (most vinegars sold in California are 5%). This is 40 to 60 grain strength. Distilled white vinegar keeps the original color in foods. Cider vinegar may slightly darken the food, but may be preferred for its flavor and aroma. Poor quality vinegar may contain copper which discolors pickles (gives a blue-green color), and gives an off-flavor. Boiling of the vinegar solution will cause some loss of the acetic acid which is important in the keeping qualities of pickles Bring the vinegar solution to a boil and then simmer.

QUICK DILL PICKLES

(Makes 6 to 7 pints)

4 pounds of 4-inch cucumbers
6 tablespoons salt
3 cups vinegar
3 cups water
3/4 to 1 cup dill seed
18 to 21 whole black peppers

1. Wash cucumbers thoroughly; cut in halves lengthwise.
2. Combine salt, vinegar, and water, and heat to boiling.
3. Pack cucumbers into clean, hot jars. Add two tablespoons dill seed and three whole black peppers to each jar.
4. Fill with boiling pickling sirup to ½ inch from top of jar. Process in boiling water 5 minutes for pints and 10 minutes for quarts.

To make KOSHER DILL PICKLES:

Peel 14 cloves of garlic and cut in halves. Add garlic in Step 2 to the salt-vinegar-water mixture. Remove the garlic after mixture has boiled, and put four cloves into each jar. Continue as in Step 3 above.

Both of these pickles need to stand several weeks for best flavor. If the green dill sprig is used instead of dill seeds, use one head of dill for each tablespoon of dill seed.

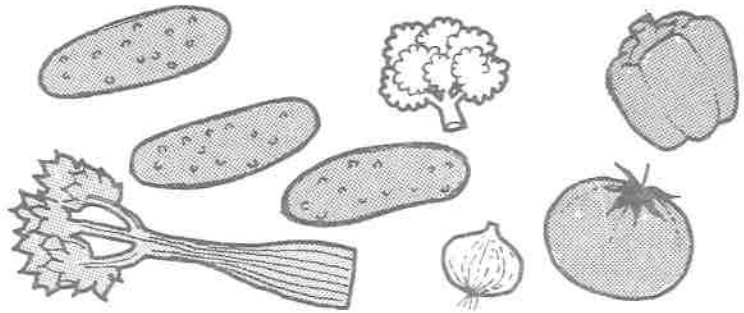
No recipe for pickled artichokes is included in this circular because the food technologists at the University of California recommend that pickled artichokes should be made for immediate consumption only and should be kept refrigerated at temperatures below 50°F. In home pickling of artichokes there is danger that the acid penetration to the center of the artichoke is not enough to prevent the danger of botulism poisoning.

MUSTARD PICKLES

(Makes 7 pints)

2 quarts cucumbers, cubed
2 small onions, chopped
5 or 6 sticks celery, chopped
1 cauliflower (about 2 pounds), separated into flowerets and divided lengthwise into pieces
2 cups green tomatoes, cubed (about 3 to 4)
2 green peppers, cut in lengthwise strips
2 quarts water
¼ cup salt
½ cup flour
½ cup sugar (white or brown)
2½ tablespoons dry mustard
1 tablespoon turmeric
1 quart plus ½ cup (about) vinegar
1 tablespoon celery seed

1. Combine the vegetables, water, and salt. Let stand overnight. Drain well.
2. Mix together the flour, sugar, mustard, and turmeric.
3. Add slowly, stirring constantly, enough vinegar (about ½ cup) to make a paste.
4. Bring one quart vinegar to a boil. Stir the paste into it.
5. Add celery seed and boil for five minutes. Stir constantly to prevent lumping.
6. Add drained vegetables; bring to a boil and simmer for about 15 minutes, or until the vegetables are tender. Add vinegar, if necessary.
7. Pack hot into hot, sterilized jars. Seal at once.



- Use fresh whole spices unless the recipe calls for ground spices. Old spices give a musty flavor to pickles. If spices are to be removed before packing, tie them loosely in a thin, clean square of cloth.
- Use a granulated cane or beet sugar. Brown sugar may be substituted if darker color or stronger flavor is desired.
- Water containing iron may cause a darkening of the pickles.
- Do not use alum. When good methods are used it is not necessary. It is difficult to measure the small amount used in home preparation of pickles. Too much alum may cause digestive disturbances and may soften the pickles.
- Do not alter the proportions given in these recipes. These recipes have been tested to give the required acidity to make them safe from botulism poisoning.

PREPARE YOUR EQUIPMENT

- Wash all equipment including the jars, rubber rings, and glass lids and screw bands in hot soapy water. Rinse well. Place clean jars and lids in boiling or scalding water until used—not less than 10 to 15 minutes. Prepare the metal lids with sealing compound according to manufacturer's instructions.
- If the jars of food are not to be processed in a boiling water bath, boil jars and glass lids 15 to 20 minutes just before packing the pickles. Keep jars in hot water until filled.
- If glass lid is used, place hot rubber ring on hot jar or on edge of the glass lid just before filling. Do not stretch it.

PROCESS PICKLES CORRECTLY

- Recipes in this leaflet are of two types—those in which the food is put boiling hot into hot sterilized jars and sealed, and those which are processed in a boiling water bath after filling the jars.

- For foods which are not processed in a boiling water bath, it is most important to fill jars to the top. Do not leave head space. This is important so that heat will contact the self-sealing type of lid, and exclude air which can darken the pickles. Invert jars immediately after sealing.

To seal hot (no boiling water bath)

1. Fill sterilized jar to top with boiling hot food.
2. Cover with liquid.
3. Wipe rim and top of jar clean.
4. Seal tightly.
5. Invert jar immediately after sealing for two or three minutes.

To process in boiling water

Certain recipes must be heat-processed to insure against spoilage.

1. Fill hot pint or half-pint jars with boiling hot food to within ¼-inch of top; quart jars to within ½-inch of top.
2. Cover with liquid.
3. Wipe off any spilled food from rim of jar.
4. Place the lids on the jars.
   - Leave short wire up on lightning-type jars.
   - If glass lid is used, screw band over the glass lid and then turn the band back about one-quarter turn.
   - Completely seal jars with metal lids that have sealing compound.
5. Process in a boiling water bath by placing filled jars on a rack in a deep container. Cover with boiling water one or two inches over the tops of the jars. The water should continue boiling during the processing time.
6. Process pint and half-pint jars for 20 minutes, and quart jars for 30 minutes.
7. As you take jars from the water bath, complete seals at once if glass lids are used. Do not disturb in any way the seal with metal lids. Leave screw bands on the jars until cooled thoroughly.
8. Place hot jars, well separated, on a rack or folded towel away from drafts or cool surfaces.

GREEN TOMATO PICKLES

(Makes 5 pints)

4 quarts green tomatoes (about 24 to 28 medium-sized)
2 cups onions (about 6 to 8 medium-sized)
½ cup salt
2 green peppers, finely chopped
3 cups brown sugar (more may be used)
2½ tablespoons celery seed
2½ tablespoons mustard seed

Tie in a bag:

2 tablespoons (scant) each of whole cloves and allspice berries
3 sticks cinnamon, about 2 inches long

1 quart vinegar (about)

1. Wash tomatoes; cut into thin slices.
2. Peel onions and cut into thin slices.
3. Sprinkle alternate layers of tomatoes and onions with salt. Cover and let stand overnight.
4. In the morning drain thoroughly, put in a kettle and add peppers, sugar, and spices.
5. Add vinegar to just cover the mixture, bring to the boiling point; let simmer for two hours, adding more vinegar if necessary.
6. Pack hot into hot, sterilized jars. Seal at once.

The pickles may be given a very fresh taste by adding a small quantity of celery, cut in small pieces, whenever they are served.

CHOW CHOW

(Makes 6 pints)

1 pound small white onions (about 2½ cups)
2/3 cup salt
2 green sweet peppers
1 red pepper, sweet or hot
1 pound small cucumbers
1 pound small green tomatoes (6 to 8)
1 pound string beans (about 3½ cups)
1 medium cauliflower
5 or 6 sticks celery
2-2/3 cups water
7 tablespoons dry mustard
2 teaspoons turmeric
1 cup sugar
2/3 cup flour
5-1/3 cups vinegar

1. Slice onions. Sprinkle with 1/3 cup salt and add enough water to cover.
2. Remove the seeds from the peppers, and chop. Sprinkle with 1/3 cup salt and add enough water to cover.
3. Let onions and peppers stand 24 hours.
4. When onions and peppers have stood 24 hours, chop remaining vegetables into medium-sized pieces.
5. Drain the brine from the onions and peppers and add 2-2/3 cups of water of this brine. Parboil all the vegetables in this diluted brine about five minutes. Drain and discard the liquid.
6. Make a paste by mixing mustard, turmeric, sugar, and flour, with a little of the vinegar; bring the remaining vinegar to a boil, and add to paste.
7. Stir for a few minutes to a smooth consistency, then pour over the drained vegetables and cook slowly for 20 minutes.
8. Pack hot into hot, sterilized jars. Seal at once.

STORE PICKLES CAREFULLY

- Pickle flavors blend after being stored a while.
- Check all the seals before storing. Those jars which have not sealed should be stored in the refrigerator.
- Store the jars in a cool, dark, dry place when they are thoroughly cool and have been labeled.
- Be sure fruits and vegetables are well covered with the pickling liquid during storage and after the jar is opened. Save pickle juice for making salad dressing and for basting meats.
- Store opened jars of pickles or relish in the refrigerator.
- As with all preserved food, properly discard any product you suspect of spoilage. This includes foods with mold or bad odor, or a mushy or gassy appearance. **Do not taste it.** To discard, see *Home Canning of Fruits*, University of California Agricultural Extension Service publication.

Fruit Pickles

PICKLED PEACHES, PEARS, or APRICOTS

(Makes 3 quarts)

4 quarts small peaches, pears, or apricots
Whole cloves
1/3-ounce stick cinnamon (about six, 3-inch pieces)
8 cups sugar (4 cups granulated and 4 cups brown sugar may be used, or all brown sugar)*
1 quart vinegar

1. Dip the peaches quickly into hot water, then rub off the fuzz with a towel, or pare the peaches.
2. Stick each peach with 4 cloves. Or, put cloves and cinnamon loosely in a clean, thin, white cloth and tie top tightly.
3. Boil the spices, sugar, and vinegar together.
4. Put the peaches into the sirup, and boil gently until soft, using one-half the quantity of peaches at a time.
5. Pack hot into hot sterilized jars. Seal at once.

Pears and apricots may be prepared in the same way, omitting the dip in hot water. The pears may be peeled.

* Less sugar may be used for a more tart pickle.

PICKLED FIGS

(Makes 7 to 8 pints)

8 pounds figs (6 quarts)
8 cups brown sugar
1 quart vinegar
1/3-ounce stick cinnamon (about 7 pieces, 3 inches long)
2 teaspoons whole cloves (less may be used)

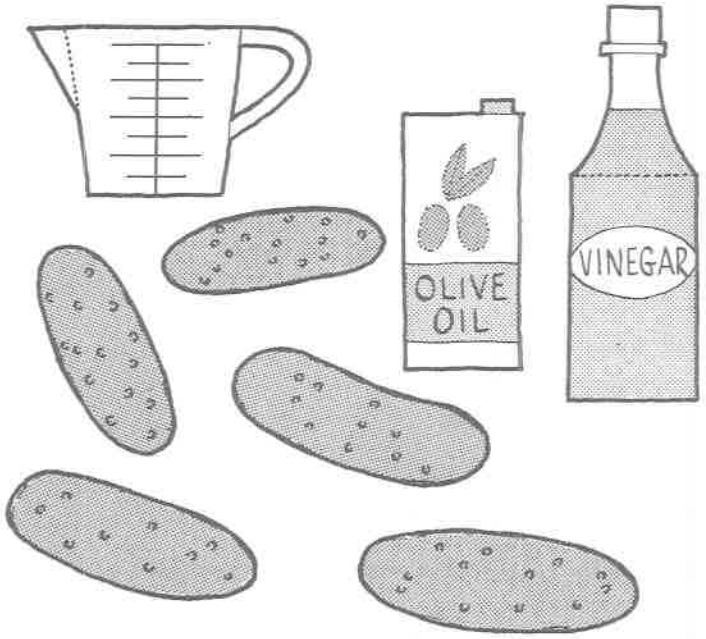
1. Wash the figs and boil in salt water (1 tablespoon salt to 1 gallon water) for 15 minutes.
2. Combine sugar and vinegar; bring to a boil. Add spices.
3. Drain figs well; then add to the boiling sirup and simmer for one hour.
4. Pack hot into hot sterilized jars. Seal at once. Be certain the figs are covered with sirup before sealing.

CANTALOUPE PICKLES

(Makes 2 pints)

1 medium-sized underripe cantaloupe
1 quart vinegar
2 cups water
1 teaspoon mace
2 pieces stick cinnamon, about 3 inches long
2 tablespoons ground cloves
4 cups sugar (or 2 cups granulated and 2 cups brown sugar)

1. Peel cantaloupe and cut into 1-inch pieces.
2. Combine the vinegar and water in a saucepan. Bring to a boil. Add spices. Spices may be tied loosely in a thin, white cloth, if they are to be removed later.
3. Place the melon pieces in a nonmetal container; pour boiling vinegar over them. Let stand overnight.
4. Pour vinegar off into a saucepan and bring it to a boil.
5. Add sugar and melon; simmer until clear, about 1 hour.
6. Pack cantaloupe hot into hot sterilized jars.
7. Bring vinegar mixture to a boil; cook to make a medium sirup. If vinegar mixture needs more cooking, place jars of cantaloupe in hot water until sirup is ready.
8. Pour boiling sirup over cantaloupe. Seal at once.



OIL CUCUMBER PICKLES

(Makes 4 half-pints)

2 quarts cucumbers (20 to 25) sliced or
2 quarts very small cucumbers
½ cup salt
¼ cup whole mustard seed
½ teaspoon celery seed
1/8 teaspoon pepper
¼ cup sugar
¼ cup olive oil
3 cups vinegar

1. Arrange cucumbers in alternate layers with salt. Cover with water and let stand overnight.
2. Drain and put into sterilized jars.
3. Add spices, sugar, and olive oil to the vinegar. Bring to the boiling point and pour over cucumbers. Seal at once.

Vegetable Pickles

ZUCCHINI BREAD AND BUTTER PICKLES

(Makes 6 to 7 pints)

1 quart vinegar
2 cups sugar
½ cup salt
2 teaspoons celery seed
2 teaspoons turmeric or dill seed
1 teaspoon ground mustard
4 quarts sliced zucchini
1 quart sliced onions

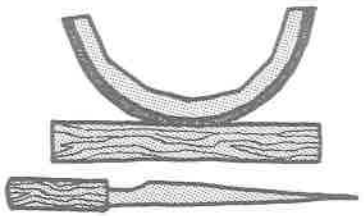
1. Bring vinegar, sugar, salt, and spices to a boil.
2. Pour over freshly sliced vegetables and let stand one hour.
3. Bring to a boil, cook for three minutes.
4. Pack hot into hot, sterilized jars. Seal at once.

BREAD AND BUTTER PICKLES

(Makes 7 to 8 pints)

4 quarts sliced small cucumbers (40 to 50), peeled or unpeeled
1 quart sliced onions
1 quart vinegar
2 cups sugar
2 teaspoons celery seed
2 teaspoons turmeric
1 teaspoon ground mustard
½ cup salt dissolved in 1 gallon of water

1. Soak cucumbers and onions in salt water overnight.
2. Combine remaining ingredients and bring to a boil.
3. Drain vegetables thoroughly and discard salt solution. Pour vinegar mixture over and let stand one hour.
4. Bring to a boil, cook for three minutes.
5. Pack hot into hot, sterilized jars. Seal at once.



NOTES ON MAKING WATERMELON PICKLES

1. A 16-pound watermelon will yield from five to six pounds of rind.
2. One pound of rind is equivalent to one quart of rind and will make about one pint of pickles.
3. The pink part of the melon will not become crisp.
4. The rind is better if melon is not overripe or one grown late in the season.

PICKLED WATERMELON RIND 4-Hour Method

(Makes 4 to 5 pints)

4 quarts melon rind, in 2-inch strips
2 tablespoons salt
Boiling water to cover
1 quart vinegar
8 cups sugar
Tie in a bag:
¼ cup broken stick cinnamon
1 tablespoon whole cloves

1. Peel strips of melon rind and trim off pink portion. Cut in 2-inch squares.
2. Add salt and boiling water to cover.
3. Simmer until rind is tender.
4. Drain and chill the rind in very cold water at least one hour. It may be left overnight.
5. After rind has chilled prepare a sirup by boiling the vinegar and sugar together. Add spices.
6. Drain rind and place in sirup.
7. Simmer until rind becomes clear and somewhat transparent. Remove spices.
8. Pack rind hot into hot, sterilized jars. Cover with boiling sirup. Seal at once.

Chutneys

APPLE CHUTNEY

(Makes 8 half-pints)

12 medium-size sour apples
6 green tomatoes
4 small white onions
3 large green peppers
1 cup seeded raisins
2 tablespoons mustard seed
2 cups sugar
1 quart vinegar
2 tablespoons salt

1. Cube the apples, chop the tomatoes, onions, and green peppers.
2. Mix with the other ingredients. Cook slowly ½ to ¾ hour.
3. Put through colander. Heat to boiling.
4. Pack hot into hot, sterilized jars. Seal at once.

BLACK CHUTNEY

(Makes 3 to 4 half-pints)

1 pound Damson plums (about 20)
2 cups dark corn sirup
1/2 cup cider vinegar
1/2 pound seeded raisins (1¼ cups)
10 prunes, cooked and pitted
1 apple, cut up
1/16 teaspoon cayenne
1/2 teaspoon each of ground:

allspice	cloves	ginger
pepper	cardamon	

1. Add water to plums to prevent sticking. Cover and cook until soft. Remove pits.
2. Combine pitted plums and remaining ingredients.
3. Cook slowly for one hour.
4. Fill half-pint or pint jars to within ¼-inch of top. Process in boiling water as directed on page 4.

Guava may be used in place of Damson plums.

CATSUP

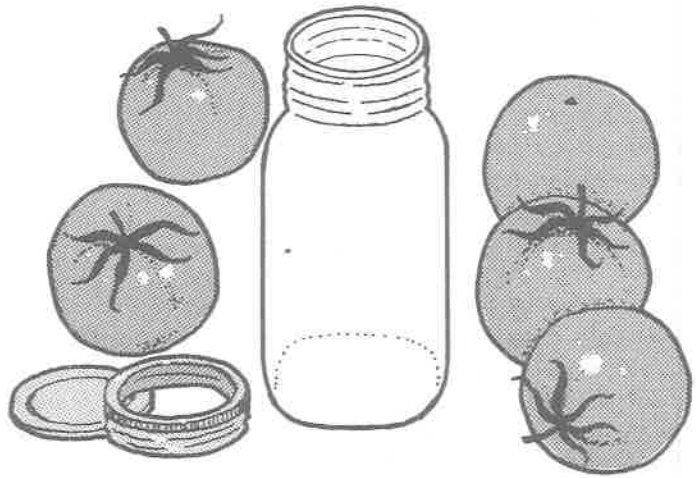
(Makes 4 pints)

18 pounds tomatoes or 7 quarts of puree
3 tablespoons salt
2/3 cup sugar
1 tablespoon paprika
¼ teaspoon cayenne pepper
1 tablespoon dry mustard blended with a little of the tomato juice to prevent lumping

Tie in a bag:

1 tablespoon whole black peppers
1 tablespoon whole allspice
1 tablespoon mustard seed
4 bay leaves
4 chilies (small hot peppers)
1 tablespoon dry basil
2 cups vinegar

1. Cook tomatoes until soft and press pulp through a sieve.
2. Add all remaining ingredients except the vinegar to the puree and cook until thick, about 1½ hours.
3. Add the vinegar the last 10 to 15 minutes of cooking.
4. Remove spices.
5. Pour hot into hot, sterilized jars. Seal at once.



Sauces and Catsup

CHILI SAUCE

(Makes 2½ pints)

2½ quarts peeled, diced ripe tomatoes
1 green pepper, finely chopped (½ cup)
2 onions, finely chopped(more may be used)
1 quart vinegar
1/3 cup sugar
2 tablespoons salt
1 or more chilies (small hot peppers)
2 teaspoons ground cloves
2 teaspoons ground cinnamon
2 teaspoons ground allspice
2 teaspoons grated nutmeg

1. Scald, cold dip, peel, and dice the tomatoes.
2. Combine tomatoes with the remaining ingredients. Heat gradually to the boiling point, and simmer for one hour or longer.
3. Pack hot into hot, sterilized jars. Seal at once.

SHIRLEY SAUCE

(Makes 6 half-pints)

12 large ripe tomatoes
2 large green peppers
2 large onions
2 cups sugar
2 cups vinegar
2 tablespoons salt

1. Peel and cut tomatoes; chop peppers and onions.
2. Combine all ingredients and simmer for two hours.
3. Pack hot into hot, sterilized jars. Seal at once.

SWEET–HOT CHUTNEY

(Makes 4 half-pints)

1 orange (½ pound)
3 medium apples (1 pound)
2 peaches, nectarines or mangoes (1 pound)
1 lemon (¼ pound)
1 onion (½ pound)
2¼ cups sugar (1 pound)
1 cup white vinegar
1 cup water
Tie in a bag 1 teaspoon of each:
whole pepper berries — cloves
allspice berries — celery seed
mustard seed — 2 chilies (small hot peppers)
1/3 cup sliced blanched almonds (about 50)

1. Chop fruit and onion into small pieces.
2. Combine the sugar, vinegar, and water. Add spices.
3. Cook the fruit in this sirup for one hour. Add almonds 15 minutes before the chutney is done.
4. Remove spices.
5. Fill half-pint or pint jars to within ¼-inch of top. Process in boiling water as directed on page 4.

If desired, more lemon may be used. Cayenne pepper, about $^{1}/_{16}$ teaspoon, may be added for a hotter chutney. One-half teaspoon ginger may be added also.

MANGO CHUTNEY*

(Makes 8 half-pints)

1 cup vinegar
3¼ cups sugar
6 cups green mango slices (about 10 medium)
¼ cup finely-chopped fresh ginger root
1½ cups seedless raisins (½ pound)
2 chili peppers (with seeds removed), finely chopped
1 clove garlic, finely chopped
1/3 cup sliced onion
½ teaspoon salt

1. Boil vinegar and sugar five minutes.
2. Add remaining ingredients and cook about one-half hour or until thick and of desired consistency.
3. Pack hot into hot, sterilized jars. Seal at once.

* From *Fruits of Hawaii*, by C. D. Miller, K. Bazore, and M. Bartow.

Relishes

AMBER RELISH

(Makes 4 to 5 pints)

12 ripe cucumbers
6 white onions
½ cup salt
water
1 quart vinegar
2 cups sugar
¼ teaspoon cinnamon
1 teaspoon mustard seed
1 teaspoon ground mustard
¼ teaspoon ground cloves
1 tablespoon turmeric

1. Peel and chop the cucumbers and onions.
2. Add salt, and water to cover. Let stand one hour and drain off the brine.
3. Boil the vinegar, sugar, and spices together for 20 minutes.
4. Add the vegetables and cook slowly until tender and all the ingredients have become yellow in color.
5. Pack hot into hot, sterilized jars. Seal at once.

BEET RELISH

(Makes 4 to 5 pints)

4 cups coarsely ground raw beets
6 cups coarsely ground cabbage
2 cups coarsely ground onions
2 cups sugar
2 tablespoons horseradish freshly grated, ot bottled
1 tablespoon salt
2 cups vinegar

1. Combine all ingredients in a large kettle.
2. Bring to a boil; cook until thick, about 20 minutes, stirring occasionally.
3. Pack hot into hot, sterilized jars to within ¼-inch of top.
4. Process in boiling water as directed on page 4.

ZUCCHINI RELISH

(Makes 4 to 5 pints)

4 cups ground zucchini
3 cups ground carrot
4½ cups ground onion
1½ cups ground green pepper
¼ cup salt
2¼ cups vinegar
¾ cup sugar
1 tablespoon celery seed
¾ teaspoon dry mustard

1. Combine all ingredients.
2. Cook together 20 minutes, or until vegetables are tender but still crisp.
3. Pack hot into hot, sterilized jars to within ¼-inch oftop. Process in boiling water as directed on page 4.

PICCALILLI

(Makes 5 pints)

6 pounds green tomatoes (18 to 20)
1 large green sweet pepper
1 hot red pepper
1 cup salt
6 cups vinegar
2 cups sugar
½ teaspoon ground ginger
½ teaspoon ground cinnamon
1 tablespoon mustard, seed or ground
½ cup horseradish freshly grated or bottled

1. Chop coarsely, or slice the tomatoes and peppers.
2. Sprinkle with salt. Cover with water and let soak overnight.
3. Combine vinegar, sugar, ginger, cinnamon, and mustard.
4. Drain tomatoes and peppers thoroughly; heat in the vinegar until tender. Keep at a simmer; don't boil.
5. Add horseradish.
6. Pack hot into hot, sterilized jars. Seal at once.

If desired, allspice, cloves, and 1½ pounds of sliced onions may be added. Combine the onions with the tomatoes and peppers before salting.

UNIVERSITY OF CALIFORNIA
AGRICULTURAL EXTENSION SERVICE

DAVIS, CALIFORNIA

August 2[illegible], 1967

TO: Home Advisors

FROM: George K. York
Extension Technologist in Food Science

RE: Corrections in Publication HXT-13 "Making Pickles, Relishes, and Chutneys"

Revised editions of the publications on making pickles are in preparation. In the meantime two errors have been discovered in publication HXT-13.

The recipe and procedure given for Bread and Butter pickles on page 14 will result in a final product which is too salty for most tastes. The recipe and procedure should be changed to:

"1/2 cup salt dissolved in 1 gallon of water

1. Cover cucumbers and onions separately in the salt solution and let stand overnight. Drain and discard salt brine."

The rest of the procedure is all right.

~~The heat~~ process for halved Quick Dill Pickles on pages 19 and 4 is too severe and will usually result in soft pickles. The boiling water process of 20 minutes for pints and half-pints and 30 minutes for quarts is not necessary because of the high total acidity (approximately 1.2 % acetic acid) and the increase of rate of heat penetration by cutting the cucumbers in half. The process times in boiling water should be reduced to 5 minutes for pints and half-pints and 10 minutes for quarts.

1463

HOW TO SMOKE TURKEYS

By Hilda Faust, Extension Nutritionist, Emeritus

Smoked turkey, prepared according to these directions, has a rather strong smoked flavor. It is generally used as appetizers or snacks, rather than as the main meat serving.

Use only turkeys of the best quality. Cure the turkeys in a brine for 14 to 21 days before smoking. Chickens and other poultry may be smoked by the same method as turkeys.

Curing

To prepare turkeys for brine curing, remove feathers, viscera, crop, the entire neck, and all superfluous tissue from inside pockets and cavities. Clean these areas thoroughly. Remove the leg tendons to allow better penetration of the curing mixture.

For 100 pounds of dressed weight, prepare the following brine:

25 pounds of salt
12½ pounds of sugar, granulated or brown
12½ ounces of saltpeter
18 gallons of water

Place turkeys in a barrel or other large container and cover with the brine.

Weight the turkeys down with a clean board and brick or stone to keep them from floating when the brine is added. The temperature of the brine should be kept as near 38° F. as possible. Leave the turkeys in the brine for 1¼ days per pound of average bird, but not less than 14 or more than 21 days.

After the fourth day, remove the turkeys and thoroughly mix the brine solution. Repack the birds, interchanging the top and bottom turkeys. Repeat this process about every 7 days until curing is completed.

At the end of the curing period, remove the turkeys from the brine and wash them thoroughly. Drain them in a cool place for 24 hours.

Smoking

Hang turkeys by the drumsticks. Enlarge the openings at both ends slightly and prop them open to provide maximum ventilation.

Let the birds hang without smoke for about 6 hours at about 110° F. Then smoke at a temperature of 110° F. for 20 hours, or at 140° F. for 16 hours. The higher temperature will give a more attractive color but will increase the amount of shrinkage slightly.

To store the smoked turkeys, hang in a cool, dry place, with the temperature no higher than 68° F. The turkeys will keep from 1 to 2 weeks if stored under these conditions.

If mold or yeast develops in the cavity of the turkey, scrub it out with cotton swabs saturated with 95% alcohol.

Before cooking, soak the bird in cold water for 2 hours or more, changing the water once.

Roast as you would fresh turkey and serve hot or cold.

ONE-SHEET ANSWERS

FARM ADVISOR HOME ADVISOR 4-H WORK
UNIVERSITY OF CALIFORNIA AGRICULTURAL EXTENSION SERVICE

Co-operative Extension work in Agriculture and Home Economics, College of Agriculture, University of California, and United States Department of Agriculture co-operating. Distributed in furtherance of the Acts of Congress of May 8, and June 30, 1914. George B. Alcorn, Director, California Agricultural Extension Service.

Revised
8/60--2000

OSA #195

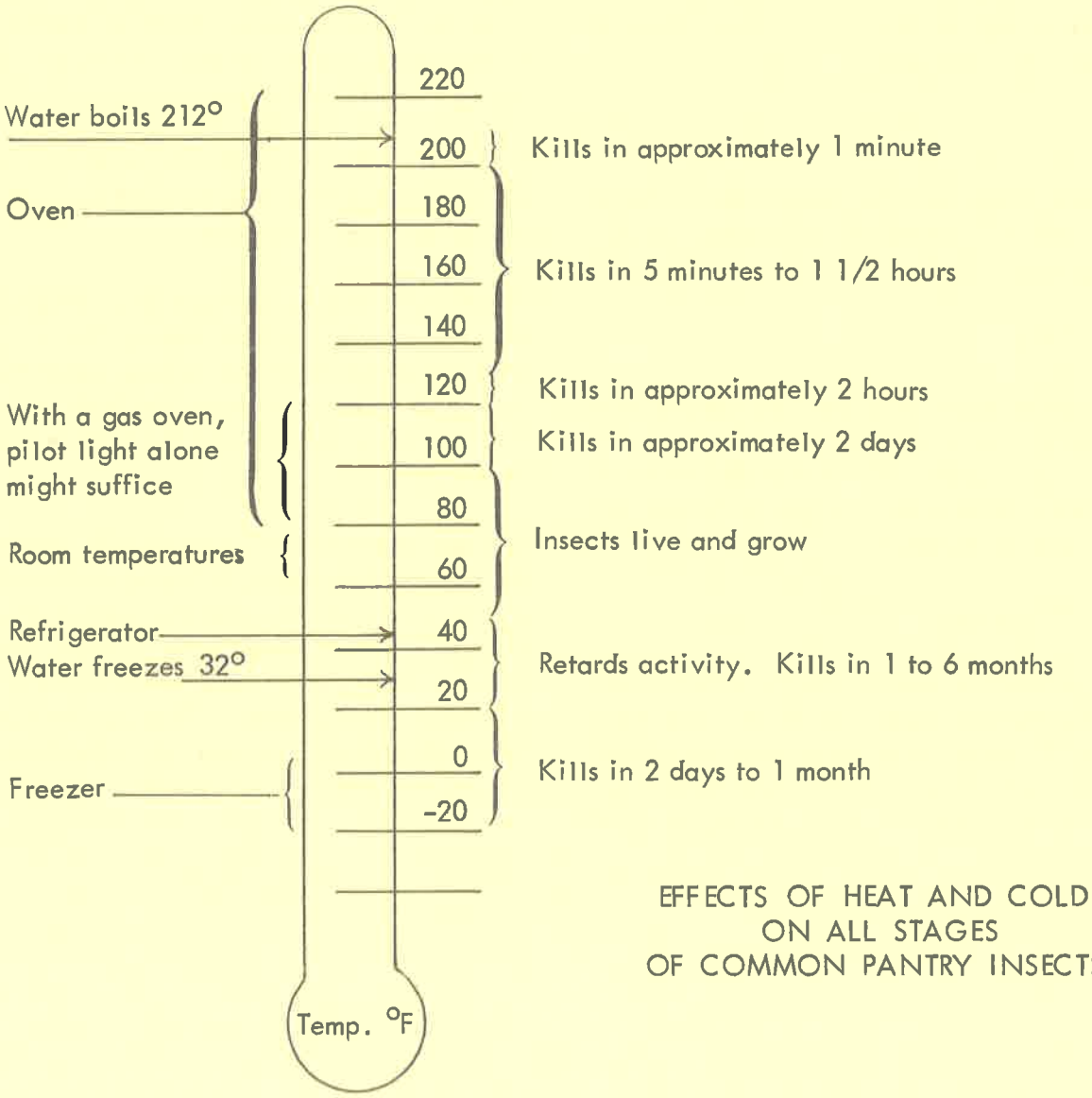
HOME STORAGE OF NUTS, CEREALS, DRIED FRUITS, AND OTHER DRIED PRODUCTS

Prepared by Jean McClew, Home Advisor, Yolo County, assisted by Christine Groppe, Extension Nutritionist, and George York, Extension Food Technologist.

The off-flavors that develop in nuts and cereals are caused largely by chemical changes in fat. These changes can be slowed by protecting the products from air and warm temperatures. Mold is not usually a problem unless there are changes in temperature that cause moisture to condense. To prevent mold, follow the procedure recommended for prevention of rancidity.

CONTAINERS

Glass jars, metal cans, and rigid plastic containers are best. Soft plastic does not guarantee protection against insects, and therefore should be used only when storing in the refrigerator or freezer or when the plastic wrapped nuts are placed in one of the recommended containers.



EFFECTS OF HEAT AND COLD ON ALL STAGES OF COMMON PANTRY INSECTS

(over)

ONE-SHEET ANSWERS
FARM ADVISOR HOME ADVISOR 4-H WORK
UNIVERSITY OF CALIFORNIA AGRICULTURAL EXTENSION SERVICE

NUTS

The shells protect the nutmeats against staleness, but homemakers often prefer to store shelled nuts. Nuts can turn rancid in 6 weeks or less, or they can keep their fresh flavor for as long as 2 years if stored at low temperatures in recommended containers.

Fill containers with nuts, to exclude all air possible, since air causes deterioration. Whole nutmeats keep better than smaller pieces, since less surface is exposed to the air. High temperatures and added fats and salt hasten rancidity. For this reason, it is best to wait until just before using the nutmeats to heat them or add butter, oil, or salt.

CEREALS

Cereals will keep well for some time if stored in a cool place in containers that keep out air, moisture, and insects.

DRIED FRUITS

Store all dried fruits at a low temperature in a recommended container that will keep out air, moisture, and insects. This slows darkening of the fruit and unpleasant changes in flavor and prevents loss of moisture.

PANTRY INSECTS

The best protection against insects is to be sure there is no food available to them. The eggs or larvae of insects may be present in almost any dried food, even though they cannot be seen. Store all foods in glass, metal, or rigid plastic containers. Then, if insects develop, they will be confined in the container and cannot spread to other areas.

Pantry insects in any stage of development can be destroyed by high or low temperatures.

At 0° F insect life is destroyed in 2 days to 1 month. At 20° to 50° F, the insects stop feeding and die of starvation in 1 to 6 months. The containers then can be removed from freezer or refrigerator and stored in a cool place.

To kill insects in dried foods by heat, place the material in an oven at 120° to 130° F for 2 hours. Spread the material thinly so the heat will penetrate all areas.

Caution: Since heat speeds rancidity in nuts, we recommend that they be used soon after being given heat treatment.

Dried fruits may be plunged in boiling water to kill insect life. Before storing fruits treated with hot water, blot the surface water from the fruit with towels, or place the fruit in an oven at a low temperature until the surface water has evaporated.

Dry ice sometimes is used to kill insects. As the dry ice disappears, it leaves carbon dioxide gas in place of air, and the insects die. For instructions in the use of this method, see Agricultural Extension Service publication AXT 107 "Common Pantry Pests." This publication also gives directions for use of insecticides for serious infestations of insects.

Co-operative Extension work in Agriculture and Home Economics, College of Agriculture, University of California, and United States Department of Agriculture co-operating. Distributed in furtherance of the Acts of Congress of May 8, and June 30, 1914. George B. Alcorn, Director, California Agricultural Extension Service.

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UNIVERSITY OF CALIFORNIA • AGRICULTURAL EXTENSION SERVICE

THE HOME PICKLING OF OLIVES

This leaflet has been prepared in response to requests for information on the pickling, canning, and curing of olives in the home. The aim is to give simple, concise working directions for processing.

ONE-LYE PROCESS FOR GREEN RIPE OLIVES

The fruit chosen for this type of ripe olive should be green, straw-colored or cherry red. Black-ripe fruit should not be used, as it is likely to become soft when pickled. This process will produce yellow or brown olives.

1. Prepare a solution by weighing out 2 ounces (about 4 level tablespoons) of lye per gallon of water.* This is easily done by dissolving a 12-ounce can of flake lye (household lye) in 6 gallons of water. Stir the solution until the lye is well dissolved. Use a wooden or stoneware container. Never use an aluminum container, for lye will ruin it; nor a galvanized metal one, as the zinc will dissolve and may make the olives poisonous.

Caution: Have nearby a cup of vinegar in which to rinse the hands if the lye solution comes in contact with the skin. (See precautions under "Antidotes for Lye Burns.")

2. Cover the olives with the lye solution early in the morning. Place over them a towel or a cloth and draw it tight enough to keep them submerged. Let the olives stand, stirring them with a lathe or stainless steel spoon once every 2 or 3 hours until the lye reaches the pits at all points. This condition is judged by cutting sample olives to the pit with a sharp knife at intervals of 1 or 2 hours. The flesh should be discolored by the lye to a yellowish-green color. It will usually take 10 to 12 hours for the pits to be reached. If orchard run of olives are used, test the largest ones. If the lye has not reached the pits by bedtime, remove the lye solution and cover the olives with water. Next morning apply a solution of 1 ounce (about 2 level tablespoons) of lye per gallon of water and let stand until the lye reaches the pits thoroughly. This may take up to 30 hours if the fruit is very green.

Occasionally this lye treatment is insufficient. Some olives neutralize most of the lye and it fails to penetrate to the pits. In such cases, prepare a fresh solution of 3 level tablespoons ($1\frac{1}{2}$ ounces by weight) of lye per gallon of water; discard the used solution and apply the fresh until it reaches the pit. Then proceed with subsequent operations given in steps 3 to 6 inclusive.

3. Remove the lye solution and discard it.

4. Rinse the olives twice in cold water; then cover them with cold water. Change the water twice a day until the lye no longer can be tasted in the olives; this usually takes about 7 or 8 days. However, it may not take this long. Commercially, it takes about 4 days. Try not to expose the olives to the air during lye treatment or washing.

5. Now prepare a salt brine of 4 ounces (about 6-1/2 level tablespoons) of salt per gallon of water. Dissolve the salt thoroughly and cover the olives with the solution. Let this stand for 1 week. The olives are then ready for use. They should be kept in a cold place.

6. If all the olives are not to be used within a period of 2 weeks, prepare a brine of 8 ounces (about 13 level tablespoons or slightly more than 3/4 measuring cup) of salt per gallon of water. Store the olives in this brine for 1 week. At the end of the week replace the brine with a solution of 1 pound of salt per gallon of water (26 level tablespoons or about 1-2/3 measuring cups per gallon). Change this, after 10 to 12 days, with a fresh brine of 1 pound of salt per gallon of water.

* One ounce by weight of flake lye is approximately equivalent to 2 level tablespoons. One ounce by weight of salt is approximately equivalent to 1-3/5 level tablespoons. One level measuring cup is equivalent to 16 level tablespoons. The particle size of a given weight of lye or salt will influence the equivalents in tablespoon measurements and, in turn, measuring-cup measurements; for this reason, it is recommended that the materials be weighed whenever possible.

When the olives are to be served, soak them overnight in water and use them within 3 days.

Caution: If at any time the olives become moldy, or "smell bad," or are soft, do not eat or even taste them. (See precautions under "Disposal of Spoiled and Suspected Olives.")

THREE-LYE PROCESS FOR RIPE OLIVES

The process described below is more complex than the one just described; its purpose is to make the olives dark brown or black in color. Use green, straw-colored, or cherry red olives. It is best to have the fruit all the same color (means same degree of ripeness).

1. First lye treatment: Prepare a lye solution of 2 ounces (about 4 level tablespoons) per gallon of water, as in the lye process already described. Pour it over the olives. Let it stand until it penetrates the skins and about 1/32 to 1/16 inch into the flesh. Start checking after 3 hours and then every 30 minutes. Remove the lye solution. Expose the olives to the air in the tub or crock (jar) in which they were lye-treated. This exposure to air gives the dark color. Stir the olives three times a day. Leave them for 3 days.

2. Second lye treatment: Prepare a solution of 1 ounce (about 2 level tablespoons) of lye per gallon of water. Pour this over the olives. Let this solution penetrate about 1/8 to 3/16 inch. Remove the lye and expose the olives to the air for 2 days.

3. Third lye treatment: This solution is of the same strength as for the second lye treatment. Pour it over the olives. Let it penetrate thoroughly to the pits. This will usually require 6 to 12 hours. Then expose the olives to the air for 1 day.

4. Cover the olives with water; change water twice daily until the olives are free of lye to the taste (7 to 8 days.

5. Cover olives with brine as described in directions 5 and 6 of the one-lye process.

HOME CANNING OF RIPE PROCESSED OLIVES

While the home canning of olives is not recommended because of the hazard to health and life that may result from improper sterilization, it is recognized nevertheless that canning of olives in the home will be continued. Because of this realization, the following directions for canning of ripe olives are given to eliminate as far as possible the danger of spoilage or of food poisoning.

The procedure is as follows: Pack the processed olives in glass jars, filling to within 1/2 inch of the top; or in tin cans, filling to within 1/4 inch of the top. Prepare a brine using 4 ounces (about 6-1/2 level tablespoons) of salt per gallon of water. Heat the brine to boiling and pour it over the olives to completely cover them. This will leave about 1/2 inch head space for the jars and 1/4 inch head space for the cans.

Place the containers in a pressure cooker and sterilize, proceeding as directed below:*

Choose a Suitable Rack

Use a steady rack in the cooker bottom. The rack may be very shallow but must have openings; it must not be a solid piece of wood or metal. If made of wire, the bands must be close enough together so that a jar cannot tilt or have an edge touch the bottom of the cooker. For two layers of jars, use a second rack high enough to separate the layers.

Have Enough Water in the Cooker

Water is necessary to form steam for exhausting the jars and for the processing period. Use about 2 or 3 inches of water. Have enough to keep the cooker from boiling dry. The water may come up on the cans or jars to about 2 inches from their tops. The amount to use will vary with the height of the rack, the size of the jars, the number of jars, and the diameter of the cooker. The rack used with low jars should be high enough to permit the use of at least 2 inches of water.

Bring the water to a boil and keep it hot while preparing the olives for canning.

To Fill Jars and Cans, and to Adjust Lids

Do not stand the jars on a cold surface while filling. As other jars are being filled, stand the filled jars or cans in a pan of very hot water. Leave space at the top of the jar as directed.

* Instructions for using the pressure cooker are quoted in part from: California Agricultural Extension Service leaflet Home Canning by Hilda Faust.

Wipe off with a clean, damp cloth the rims or threads of the jars, or the rubber rings.

(1) To use a metal lid that has a sealing compound and a metal screw band: Place the lid on the filled jar and screw the metal band on tight by hand before processing.

(2) To use a glass or zinc lid, or tin cans, exhaust the filled jar or can. With a rubber ring, have the wet ring in place on jar or lid, and place lid on jar. With a screw band over a glass lid, or with a zinc cap, screw on the band or cap very loosely, just starting it in its groove. With the lightning-type jar, leave short wire up. Leave lids off tin cans.

Put jars or cans on the rack in cooker. They may stand in water up to 2 inches from tops. Leave space between them so that steam can circulate. Place lid on cooker; leave lid unfastened, and petcock open, or vent pipe uncovered. Bring water in cooker to a boil. Do not let water boil into jars.

Keep the jars or cans in the steam (exhaust) for 10 minutes. Remove lid from cooker. Immediately tighten jar lids completely: with glass lids, screw down bands or lower bails; screw down zinc lids. Seal tin cans: place a lid on each can and use a can sealer.

Exhaust the Cooker Long Enough

Before processing the jars, drive all the air out of the cooker by letting the steam escape:

(1) Arrange the hot, filled jars on the cooker rack so that they do not touch each other or the cooker wall.

(2) Completely fasten the cooker lid, leave the petcock open or the vent pipe uncovered, and let a stream of steam escape from the petcock for at least 10 minutes. (Air prevents the temperature from becoming as high as it does at a given steam pressure and will cause uneven heat distribution.)

To Process

Close the petcock or put on the weighted gauge. Begin to count time after the required pressure is reached. Control the heat to keep the pressure constant at the desired point, namely, 10 pounds (240° F) or slightly above. Process for 60 minutes. For each 1,000 feet elevation above sea level increase the pressure by 1/2 pound. If the pressure falls below that recommended, the olives may not be safe to use.

To Release the Steam

Turn off the heat or remove the cooker from the heat without tilting it. Do not set on a cold surface. Let the pressure return to zero before opening the petcock. Open the petcock gently and gradually. Preferably wait 1 or 2 minutes after the pressure has reached zero before opening the petcock if glass jars have been used, but do not wait longer.

To Cool and Open the Cooker

Preferably allow the cooker to cool for 15 minutes after the petcock has been opened before releasing the lid of the cooker, if glass jars are inside. In removing the cooker lid, lift first the side farthest away so that the lid may protect you against steam. If it took more than 20 minutes for the gauge to return to zero, however, this wait may be omitted. If the lid is removed immediately after the steam is released through the petcock, let the jars cool for 10 or 15 minutes before lifting them out. Do not let a draft strike the jars. If cans are used, open the petcock and remove the pressure cooker lid when the pressure has returned to zero, and plunge the cans into cold water.

To Remove the Jars

Do not in any way disturb the seal of a jar after this processing. The attempt to tighten the lid of a sealed jar when it has just been removed from the cooker is almost certain to cause spurting or bursting. Use a jar lifter or a cloth such as a dish towel, in lifting the jars from the cooker to the table. Hold the towel over the top of the jar.

Bubbling within the jar on removal from the cooker after the jars have cooled somewhat in the cooker, shows that the contents are boiling under vacuum, a sign of a good seal.

Caution: When a jar of these olives is to be used, before tasting or using, empty contents into a pot and heat to boiling temperature and boil for 15 minutes; cool by placing the olives in cold water. This heating will prevent any possibility of botulinus poisoning.

FREEZING OF RIPE OLIVES

If one has a frozen food locker, it is feasible to preserve pickled Mission olives; other varieties soften very badly on freezing and thawing. Proceed as follows:

Using olives pickled by the one-lye or the three-lye process, cover them with brine containing 4 ounces (about 6-1/2 level tablespoons) of salt per gallon and then boil them for 10 to 15 minutes. Discard the brine and chill the olives in cold water. The purpose of the boiling is to minimize softening on freezing. Then pack without brine in locker-plant cartons, glass jars, friction top cans, or used coffee cans. The package should be moistureproof and vapor tight to prevent drying out. Seal the used coffee cans with freezer tape. The other containers are sealed tightly in the usual manner. Then have the packaged olives quick-frozen and stored in the frozen food locker.

To use, allow the olives to thaw thoroughly before serving. If desired, roll the thawed olives in olive or salad oil mixed with chopped garlic or other seasoning; let stand overnight and serve.

GREEK-STYLE OLIVES

Olives prepared Greek-style are generally made from mature olives (any variety, but usually Mission olives are used) that are dark red to black in color. Use smaller olives as larger ones get soft. The olives are salt-cured and therefore are somewhat shriveled in appearance. One must acquire a taste for them as they are salty and slightly bitter. Prepare them as follows:

1. Obtain some half-ground rock salt (ice-cream freezer salt).

2. Cover the bottom of a wooden box with burlap.

3. For each 2 pounds of olives, weigh out 1 pound of rock salt. Mix the salt and olives well in the wooden box. Mold will develop if salt and olives are not mixed well. Pour a layer of salt over the olives to a depth of about 1 inch.

Caution: Place the box outdoors so that the brine formed will not ruin the kitchen floor.

4. At the end of a week, pour the salt and olives into another box, then replace them in the first box to mix the olives and salt. Thereafter repeat this mixing process once every 3 days until the olives are cured and edible. This usually takes about 30 to 35 days.

5. Sift out most of the salt on a half-inch screen. Dip the olives momentarily in boiling water. Drain. Let them dry in air overnight. Coat the olives with olive oil only as used. Do not use oil if the olives are to be used for cooking. To coat with oil, put them in a large pan or box and sprinkle a little olive oil over them. Work the olives with the hands to coat all with oil.

6. To each 10 pounds of olives add about 1 pound of rock salt. Mix and put the olives in a cool place. Use within a month, or store in a refrigerator until used. This type of olive is useful in the flavoring of such dishes as stews, tamale pie, spaghetti, and as a relish.

SPANISH-STYLE GREEN OLIVES

The Spanish-style green olive is identified by its green skin, light flesh, and light brownish-buff pit. It has a characteristic flavor and aroma imparted by lactic acid fermentation; these in common with the inherent qualities of the fruit make it sought as an appetizing pickled olive in the United States, where it has found favor for many years. Fruit from any variety pickled while immature and specially processed comes under this category. However, the Sevillano and Manzanillo varieties are best to use. The essential steps in the preparation are as follows:

1. The olives to be used in this process are picked when green to straw yellow in color. Care should be taken to avoid bruising, for all such marks are accentuated in the pickled fruit.

2. The olives are then sorted according to size, or they may be prepared for pickling from "orchard run" fruit which has not been size-graded. It is important to discard all defective fruit.

3. The sorted fruit is placed at once in a lye solution to destroy most of the bitterness. Queen olives (the Sevillano variety) are treated in a solution made with 1-3/4 to 2 ounces (3-1/2 to 4 level tablespoons) of lye per gallon, as they frequently blister and peel when treated with too strong a solution. Cover with cheesecloth or burlap to act as a wick, the same as for green ripe olives. The Manzanillo and Mission varieties, which are more bitter than other varieties--but are not subject to peeling--are treated in a stronger solution made with 2-1/4 to 2-3/4 ounces (4-1/2 to 5-1/2 level tablespoons) of lye per gallon.

4. The lye is allowed to penetrate, on the average, about three fourths of the way to the pits of the olives. A

little residual bitterness should be left. Penetration is judged by cutting olives to the pit with a knife and observing the extent of the discolored flesh.

5. When lye penetration is completed, the lye solution is removed and quickly replaced with cold water. The water used for leaching out the excess lye is changed at 4- to 6-hour intervals during a 24- to 30-hour period. Avoid too prolonged washing and undue exposure of the fruit to the air as undesirable darkening of the olives may result.

6. After washing has removed the excess lye the olives are packed in suitable containers as rapidly as possible and are covered with a salt solution containing 1 pound (about 26 level tablespoons or 1-2/3 measuring cups) of salt per gallon. The number and size of the containers chosen will depend upon the quantity of olives. One gallon of olives in brine contains about 5.5 pounds of fruit.

7. After the olives have been placed in suitable containers and covered with salt brine, they should be stored where the average temperature does not exceed 100° F. Fermentation will be most rapid at temperatures between about 70° and 90°. Glass-top fruit jars (not smaller than 1 quart) are best to use, if available. Do not fasten lids too firmly. For larger quantities of olives, 5-gallon kegs or larger-sized oak barrels may be used as containers.

8. The containers of olives must be kept full of brine at all times. During the period of active fermentation, 4 or 5 days, when gas formation causes excessive foaming and frothing, care must be taken to replace the brine lost.

Later, when gas production is not so violent the closures should be tightened firmly enough to exclude air and thus keep film yeast and mold growth at a minimum. All brine lost must be constantly replaced. This brine should contain about 9-1/2 ounces (about 15-1/4 level tablespoons or 1 cup minus 2-1/4 teaspoons) of salt per gallon of water.

9. If Manzanillo or Mission varieties are being pickled, supplementary sugar may have to be added to the brine. Corn sugar, corn sirup, cane or beet sugar or sirup may be used. (Cane or beet sugar or sirups are slightly better to use.) The sugar should be added at the rate of 1-1/2 level teaspoons per gallon. The sirup should be added at the rate of 2 level teaspoons per gallon.

Sugar or sirup should not be added until the fermentation has been under way for at least 4 days. The desired acidity depends upon the conversion of sugar to lactic acid. Additional sugar may be necessary to attain this desired acidity.

10. Since the development of the desired degree of acidity of the fermented olives depends upon the presence of lactic-acid bacteria, it may be necessary to add "starters" of these bacteria which are contained in bulk (unheated) dill pickle or sauerkraut brine. This brine should be added at the rate of 6 fluid ounces (about 3/4 measuring cup) per gallon of olives and brine. The addition of this "starter" is particularly recommended for the Mission and Manzanillo varieties, and is sometimes required for the fermentation of the Sevillano.

11. On completion of fermentation, as determined by development of the desired acidity and taste characteristic of Spanish-style green olives (note precaution below), the containers should be completely filled with brine, closed tightly, and stored in a cool place until the olives are used.

12. Any fermenting olives which develop a rancid, foul odor should be discarded. When any doubt whatsoever is felt concerning the edibility of the olives they should be discarded. This is a cardinal rule which should apply for all home-pickled or canned foods.

SICILIAN-STYLE OLIVES

Sicilian-style olives are fermented and have about the same characteristics as the Spanish-style olives already described, yet differ in that they are somewhat bitter because they are given no lye treatment and are prepared in a spiced brine. These olives are sold chiefly in the Italo-American trade but many Anglo-Saxon Americans also like them. Their preparation is as follows:

1. Use green olives of any variety. Sevillano is usually used.

2. Place them in a barrel or glass-top fruit jar.

3. Add dill-pickle spices from a grocery store--about 1 rounded tablespoon per 2-quart jar, or 1 level tablespoon per quart. Also add a little (1/2 level teaspoon per quart) fennel seed, or add a sprig of fresh fennel or dill. Some prefer to make a "hot" seasoning by adding whole pepper corns and whole red peppers to taste.

4. Prepare the same salt solution described for Spanish-style green olives. To each 10 pints of solution add 1 pint of vinegar, and fill the jar or barrel with this brine. Store the container of olives at about 70° F.

5. Do not seal. Place the lid on, but not too tightly. Replace any lost brine as directed for green olives.

6. When all gas formation ceases (usually in 2 to 3 months) seal and store until the olives are of the desired flavor. The total period from the time of filling the jar or barrel to completion of the process is usually 4 to 6 months. The olives will remain somewhat bitter and will acquire a flavor somewhat like that of Spanish-style green olives, yet will be pleasingly different if spiced.

Caution: Any olives that develop a rancid or foul odor should not be tasted. Discard them.

DISPOSAL OF SPOILED AND SUSPECTED OLIVES

Botulism is a food poisoning which results in a very large percentage of fatal cases. It is caused by ingestion of poison produced by botulinus bacteria growing in low-acid foods in the absence of air. Low-acid foods include vegetables, meat, poultry, and fish, for the most part. Figs and pickled ripe olives also are low-acid fruits. All low-acid foods including pickled ripe olives require special precautions after home canning. These precautions are as follows:

1. Boil all home-canned ripe olives before tasting or feeding to others. The poison produced by the botulinus bacteria is destroyed by boiling. To boil, empty the olives into a pan and place directly over the source of heat. Stir the olives frequently. Boil steadily for at least 15 minutes, counting time after boiling has begun. Add more liquid during boiling if necessary but allow more time if the liquid ceases to boil on addition of more liquid. At altitudes above 3,000 feet boil the olives for at least 25 minutes.

Smell the olives while boiling them. Any sour, rancid (stale butter smell) or putrid off odor is made more noticeable by boiling.

2. Never taste any home-canned olives that are moldy, have an off odor, show gas pressure in the cans or jars, or show corrosion of the cans or jar lids. Olives in bulging or rusted cans, jars with bulging or rusted lids, or jars with liquid oozing from under the lid, must be destroyed.

3. Spoiled or suspected olives in opened home-canned tin or glass containers can also be rendered safe for disposal by processing in the pressure cooker. The can or jar, if bulging, must be opened carefully to prevent discharge by gas pressure of brine which may be ingested; i.e., taken into the mouth wittingly or unwittingly. This is best accomplished by puncturing the top of the can or the lid of the jar with an ice pick or other sharp instrument, taking care to have the container top adequately wrapped with a towel or other cloth to avoid spurting out of liquid. The towel or other cloth is then disposed of by burning. The containers of olives thus relieved of gas pressure are safe for processing in the pressure cooker. Process the spoiled or suspected olives at 10 pounds pressure (240° F.) for 15 minutes. (Follow the directions already given for operation of the pressure cooker.)

After processing, the liquid contents are disposed of as sewage and the container and contents may be discarded as garbage, or the glass jar may be used again.

Scrupulous care must be taken to prevent drops of spoiled or suspected olive brine from coming in contact with open cuts, broken skin areas and mucous surfaces (mouth and eyes). A small drop of poisonous liquid is extremely dangerous to human beings or animals.

4. Alternative procedures for disposal are to burn the food and its container in a furnace, boil in soapsuds, or in a lye solution, or add lye, and bury. Keep lye out of reach of children and animals, and handle it with care (see precautions below).

The poison may be destroyed by placing the opened jar, together with its lid, screw-band, etc., or can of olives on its side in an old pail or pan, not of aluminum, and boiling it in strong soap solution or lye.

a) To boil in soap solution, make a strong solution of soap (2-1/2 to 3 measuring cups per gallon) and water. Keep the jar and its contents covered with soap solution during the entire boiling period. Boil for 1/2 hour, counting time after boiling starts.

b) To boil in a lye solution, use 2 level tablespoons of flake lye per quart of water. Keep the jar completely covered with the lye solution. Boil for 10 minutes, counting time after boiling commences. After boiling in either soap solution or lye, pour the liquid down the drain, flushing it with

plenty of water, and discard the olives in the garbage. The jar may be used again or discarded.

c) To add lye and bury, mix 2 level tablespoons of flake lye with the contents of the container of olives. Allow to stand for one day and then bury the can or jar and its contents deep enough to insure that children or pets will not dig it up until the caustic action of the lye has entirely disappeared.

5. Never feed animals or poultry spoiled or suspected home canned olives. Never ask someone else to taste olives you, yourself, do not care to taste.

6. If someone has tasted or eaten spoiled or suspected home-canned olives, contact the city, county, or state health department immediately. Save a sample of the olives for laboratory examination by keeping it in a clean glass jar, preferably in a refrigerator.

ANTIDOTES FOR LYE BURNS

If lye solution has inadvertently caused burning or has been swallowed, the following precautions are necessary.

1. Administer vinegar, lemon, orange, or other acid fruit juice until lye appears to be neutralized.

2. Administer white of egg or milk by mouth.

3. Do not induce vomiting.

4. Combat shock by placing person affected in reclining position with head lower than body and wrapping him in blankets.

5. Call the family physician.

If lye solution has inadvertently been splashed into the eye, flush the eye in a stream of running water, bathe the eye with boric acid solution, and call the family physician.

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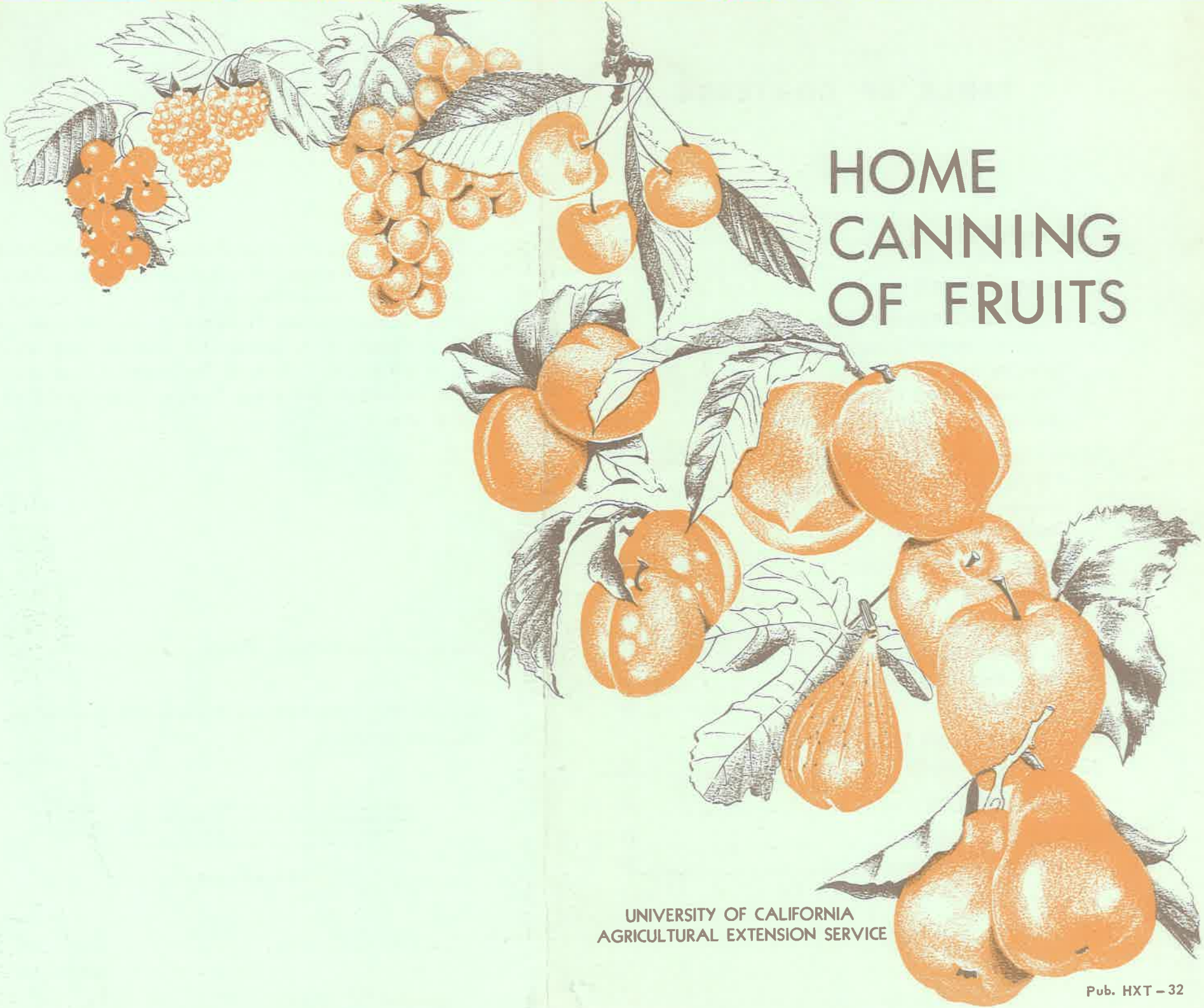

HOME CANNING OF FRUITS

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Revised May, 1959, by Hilda Faust and Marion T. Tate, laboratory technician.

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HOME CANNING OF FRUITS*

Heat is essential in canning foods, for it destroys the organisms that cause the food to spoil. Sealing prevents further entrance of organisms.

Use These Methods

Processing, in canning, means heating food in jars or cans in a canner to kill the spoilage organisms. For canning, foods fall into three groups according to the method suitable for each:

1. Some fruit juices of thin consistency are heated to a temperature of 190°F. They are then canned or bottled hot and sealed at once. The jar is inverted for a few minutes immediately after sealing.

2. Fruits, tomatoes, and rhubarb, and vegetables canned in an acid solution are processed in boiling water. Thicker fruit juices, including tomato juice, are canned at the simmering point and processed for five minutes or more in boiling water.

3. All vegetables (except tomatoes) and meats, poultry, and fish take temperatures higher than that of boiling water to process them safely in a reasonable length of time. To get these high temperatures, steam under pressure must be used. Some vegetables, however, may be canned in an acid solution if the directions are carried out exactly as instructed on pages 10 to 12.

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*and Tomatoes, Rhubarb, and Acid Canning of Vegetables

Don't Use These Methods

OVEN METHOD

This method is not recommended for any product. There is danger from explosions, and danger of too little processing because of the slow rate of heat transfer from air, and uneven heat distribution in ovens.

OPEN-KETTLE METHOD

In the open-kettle method, the food is completely cooked in an ordinary kettle, then packed into hot sterilized jars and sealed immediately. This method is not recommended for fruits, tomatoes, or tomato juice because the spoilage organisms may get into the jar when the food is transferred from the kettle to the jar. In addition, this method is not recommended for low-acid vegetables, or for such products as meat, poultry, and fish, because the heat treatment is not sufficient to prevent spoilage and possible food poisoning.

It is safely used for thin fruit juices if the preheated jars are inverted immediately after sealing.

BOILING-WATER BATH NOT RECOMMENDED FOR LOW-ACID FOODS

In the boiling-water bath method, the jars are completely covered with boiling water throughout the processing time. This method is not recommended for meat, poultry, or fish, or for vegetables other than tomatoes. The heat treatment is not sufficient to guard against spoilage in these foods and against possible food poisoning.

This method is recommended for fruits, tomatoes, tomato juice, pickled vegetables, and acid canning of vegetables.

jar on its side. Fill the pan with strong soap or detergent solution and boil for one-half hour. Keep the jar completely covered with soap solution during the entire boiling period. After boiling in suds or detergent, pour the liquid down the toilet, following with plenty of running water, and discard the pieces of food in the garbage. Do not use the jar or closure again.

Use a household bleach (4 parts water and 1 part bleach) or rubbing alcohol to rinse your hands thoroughly and all articles that have been in contact with the questionable food. After carefully rinsing your hands and articles, wash them thoroughly with soap and water.

7. If someone has tasted a questionable food, call the doctor at once, and get in touch immediately with the city, county, or state health department. In the meantime, keep the food and jar in a place where there is no possibility of humans or animals tasting the food. Handle the food and container as little as possible. If the original jar, closure and the food are available, keep them. If the food is still in the original container, keep it there. The food and jar are essential to the health department in checking for the presence of toxin. Remember to wash your hands and other articles as directed.

Report immediately to the local health officer any cases of suspected botulism in chickens and other animals. The condition known as "limberneck" in poultry is a form of botulism.

4. Never taste any canned food about which there is doubt, that shows gas pressure in the can, jar, or bottle, that is mushy or gassy in appearance, that is moldy, or that has a disagreeable odor. A sour, rancid, or putrid odor is a warning, but it is not always present in poisonous food. Do not let animals or poultry have access to spoiled food.

5. Keep the spoiled food out of the kitchen if possible.

6. By methods given here, dispose of any food from a bulging or corroded can, from a jar with a bulging or corroded lid, or from a jar having any oozing from under the lid. Dispose of any preserved food that has a bad odor or a mushy or gassy appearance, or that is moldy.

In handling the jar or can that shows spoilage, be careful not to spill the contents.

Do not discard food which shows spoilage in any place where it may be eaten by poultry or other animals. Do not throw suspected food out on the ground.

Foods which show any of the signs of spoilage just given (signs of development of botulinum toxin) may be disposed of in the toilet if the food is liquid enough. Boil the jar and closure in a strong soap or detergent solution for one-half hour, and then discard them. The smallest bit of untreated, unboiled suspected food remaining on the jar may be enough to cause botulism.

Another method to discard questionable food is to boil the food and the jar and closure one-half hour in a strong soap or detergent solution. Empty the contents of the jar into an old pan or pail and be sure to put the jar with the lid and screw band or rubber ring in the same container. Have the

Jars, Lids, and Rubber Rings

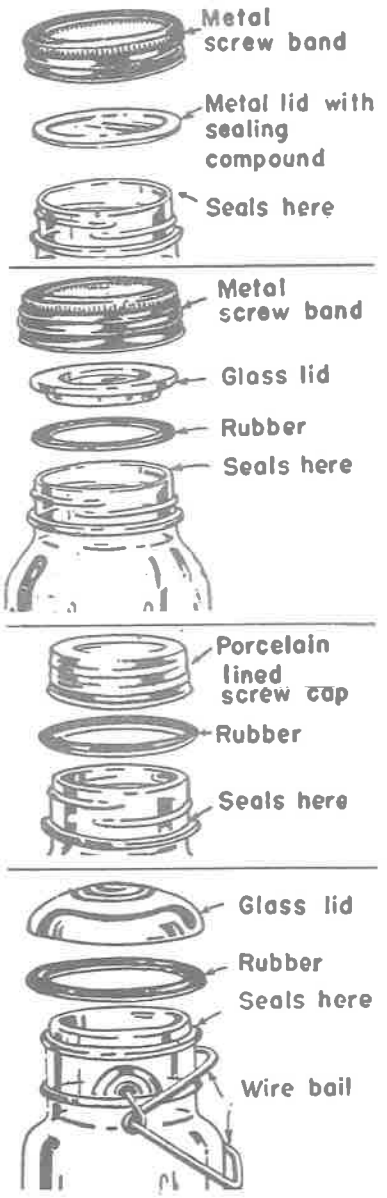
1. The screw-top jar (Mason jar). There are at least three kinds of closures for this jar:

A. The metal disk with sealing compound in a groove of the lid. Place the compound against the jar's top. Use this lid only once. A metal screw band holds the lid on during processing and cooling.

B. The glass lid or glass disk having a separate rubber ring fitted on a ledge on the underside of the lid. The rubber ring rests on the top of the jar. A metal screw band holds the lid on during processing and cooling. (This screw band is wider than the one used with a metal disk.)

C. The porcelain-lined zinc screw lid. This cap requires a separate rubber ring which fits on a ledge about an inch from the top of the jar.

2. The jar with a glass lid and a separate rubber ring held in place by a wire bail closing over the lid (lightning-type jar). The rubber ring rests on a ledge at the top of the jar.



SELECTING JARS, LIDS, AND RUBBER RINGS

Be sure each jar has a lid that fits. If the lid requires a screw band, be certain that it is the right depth and width.

Provide new lids each time metal lids with sealing compound are used, or if zinc screw caps are bent along the rim, or if their porcelain lining is broken. Do not use a glass lid nicked along the rim.

If a jar shows even a slight nick on the top edge, do not use it with a rubber or metal disk that rests on the top.

If using rubber rings, have new rings of the right size for the jars. Do not test rings by stretching.

PREPARING JARS AND CLOSURES

Jars, glass lids, zinc caps, and screw bands. Wash in hot soapy water and rinse well. To use, place in boiling water and bring to a boil. Let stand in boiling or scalding water until used, for at least 10 to 15 minutes, especially if the jars have been used before. Drain just before using. Have a rack or a folded clean cloth in the bottom of the pan.

Rubber rings. Rinse thoroughly in clear boiling water. Do not put them in the pan of water with the jars. Place the hot, wet rubber ring on the hot jar, or on the ledge of the glass lid, just before filling. Do not stretch it.

Metal lids. Follow the manufacturer's directions for scalding or boiling metal lids that have a sealing compound. If no directions are given, scald in boiling water just before they are placed on the jars.

that has a tested gauge, adjusted or at a new reading if needed. Do not process for less than the prescribed time. Or, for some vegetables, can in an acid solution. (See "Acid Canning of Vegetables," page 10.)

3. If the directions as given in this booklet have not been followed in every detail or if there is any doubt about the contents of the jar or can, DON'T TASTE BUT BOIL home-canned goods for at least ten minutes. This caution applies to the use of all home-canned low-acid foods – vegetables (including those acid-canned), meats, poultry, and fish. To boil, empty the food into a pan and place directly over the heat. Stir the food. Break up clumps. Count time after boiling has begun. Boil steadily for at least 10 minutes at sea level, up to 3,000 feet. Greens and cream-style corn must be boiled for at least 20 minutes at those altitudes. Add water, if necessary, during boiling. At altitudes above 3,000 feet, boil the product for at least 15 minutes, because the boiling temperature of water decreases with increase in altitude. If it is a close pack, such as spinach, or a thick product, such as cream-style corn, boil for at least 30 minutes at altitudes above 3,000 feet. At very high altitudes, boil even longer than the times given.

Smell the product while boiling it. The odor of botulism spoilage may not be detected in cold food. Any off-odor, if present, is made more noticeable by boiling. The odor is that of decomposition, usually somewhat putrid and cheesy or rancid.

It is not necessary to boil acid foods (fruits, tomatoes, and rhubarb) unless spoilage is suspected.

Beware of Botulism

Home canning is a source of satisfaction, a good means of food preservation, a way to provide variety in family meals, and to some homemakers, an expression of true art. When the careful directions in this circular are followed, there is little or no chance of the homemaker finding spoilage in the home canned foods. On the other hand, merely tasting improperly canned food may cause a serious illness -- a form of food poisoning called botulism. It is generally fatal. Therefore, follow carefully the directions given here when using any home canned food, and never taste food that appears to be spoiled.

Botulism is caused by the toxin produced when botulinum bacteria are present and grow in foods in the absence of air -- in foods that are low in acid or that have become low-acid. The toxin is one of the most poisonous substances known. However, it can be completely destroyed by boiling as directed in point 3, below.

These low-acid foods are vegetables, meat, poultry, and fish. Acid foods (fruits, tomatoes, rhubarb, and pickles) may become low-acid through the growth of mold. Figs and green peppers are low-acid foods, however, and require special precautions in processing.

TO HELP PREVENT BOTULISM

1. For canning, use only fresh, firm fruit; fresh, firm, crisp vegetables that have been thoroughly cleaned and washed; and meat, poultry, and fish that are in sound condition. Can vegetables and fruit as soon after picking or gathering as possible.

2. For canning all low-acid vegetables and other low-acid foods -- meats, poultry, and fish -- use a pressure cooker

COOLING JARS, TESTING SEALS, AND STORING

To cool jars. Set the hot jars, well apart and right side up, on a board, rack, or folded cloth, not on a cold surface. Keep them out of a draft but do not cover. Cool completely to room temperature before putting away or stacking, or set them on shelves with room for air to circulate around them. After cooling, remove screw bands from jars having glass or metal disks underneath. To loosen a band that sticks, cover with a hot, damp cloth for one or two minutes.

To test seals. (1) With jars that have a separate rubber ring, tilt and turn them in the hand to check for leaks. (2) To test those with metal disks that have sealing compound, note the top of the jar. A concave lid indicates a good seal. Or, tap the lid with a spoon. A clear, ringing sound indicates a seal. Or, test such a jar by pressing on the lid with a finger. The lid should not give when tested. (3) Test a jar having a glass or metal disk by lifting the jar by the lid after the screw band is removed.

To label and store. Wipe the jars with a damp cloth, label and date them, and store in a cool, dark, dry place.

To reprocess a jar. If a jar did not seal, use the food within 24 hours after canning, if it looks and smells all right, or recan it. Use a new metal disk or rubber ring and check the jar and the glass lid (if used) for flaws.

For fruit, put the lid on loosely and stand the jar in hot water to about two inches from the top. Exhaust by boiling for 15 minutes.

With vegetables, meat, poultry, and fish, and with fruit if preferred, begin all over again as with a fresh product.

After handling either way, process by the method originally advised, and for the full length of time.

To Can in a Boiling-Water Bath

The food is processed in boiling water. Use a boiling-water bath for fruits, tomatoes, and some fruit juices such as tomato juice, and rhubarb, and for the acid canning of some vegetables.

A large, clean container fitted with a rack for holding the jars is required for processing. It must be deep enough for the jars to stand on a rack and to be covered with one to two inches of water, and for the water to boil briskly. It must have a lid that fits well. Select a rack with openings (not solid) on which the jars can stand firmly without danger of tilting. Have it raised off the bottom at least one-half inch, if possible.

If a pressure canner is deep enough, it may be used as a water bath. Preferably use a lid other than the canner lid, or leave the lid unfastened and the petcock open.

TO FILL JARS AND ADJUST LIDS

Do not stand the jars on a cold surface while filling. As other jars are being filled, stand the filled jars or cans in a pan of very hot water.

Put the food, precooked or not, into the hot jars according to the directions for the food being canned. See the table for fruits, page 13, and "Acid Canning of Vegetables," page 10. Pack loosely. Leave space at the top of the jar as directed.

Pour boiling liquid over the food according to the kind of food being canned. Cover well with the liquid, but again leave space at the top as directed. Work out air bubbles with a stainless-steel knife or spatula.

Peaches	Bushel (46 to 50 lbs.)	18 to 24 quarts
	2 layer lugs (aver. 20 lbs.)	7 to 10 quarts
	3 layer small lugs (26 lbs.)	10 to 13 quarts
	2 to 3 lbs.	1 quart
Pears	L.A. lug (24 to 28 lbs.)	8 to 13 quarts
	Pear box (46 lbs.)	16 to 22 quarts
	2 to 2½ lbs.	1 quart
Plums	L.A. lug (aver. 28 lbs.)	12 to 15 quarts
	3 quarts (5 lbs.)	2 to 3 quarts
	2 to 2½ lbs.	1 quart
Rhubarb	Apple Box (38 to 45 lbs.)	30 to 45 quarts
	L.A. lug (25 to 30 lbs.)	16 to 30 quarts
	1 to 2 lbs.	1 quart
Tomatoes	Lug (32 lbs.)	10 to 12 quarts
	4 basket crate (22 lbs.)	7 to 9 quarts
	2½ to 3½ lbs.	1 quart

[1] In California markets there is a variety of containers and boxes. This table gives approximate yields for the usual container, the L.A. Lug (No. 1). (L.A. lug inside 5¾ x 13½ x 16-1/8 inches; 0.58 bushel or 0.72 cubic feet.) Yields from certain other common containers, and the approximate amount of fruit for one quart canned are also included.

Estimated Yields of Canned Fruit from Fresh Fruit

FRUIT	FRESH [1]	CANNED
Apples	"Northwest" Box (48 lbs.) 2½ to 3 lbs.	16 to 20 quarts 1 quart
Apricots	Lug (24 lbs.) 2 to 2½ lbs.	10 to 12 quarts 1 quart
Berries (except strawberries)	½-pint basket, 12 basket tray (6 to 8 lbs.) 4 to 8, ½-pint baskets	1½ to 3 quarts 1 quart
Cherries, unpitted	Box, or Campbell lug (15 to 16 lbs.) L.A. lug (23 to 27 lbs.) 3 to 4 pints, or 2 to 3 lbs.	6 to 10 quarts 8 to 16 quarts 1 quart
Figs	5 to 6 lb. box 2 to 2½ lbs.	2 to 3 quarts 1 quart
Grapefruit	4 to 6 grapefruit	1 quart
Grapes	L.A. lug (28 lbs.) 4 basket crate (20 lbs.) 4 lbs.	7 to 8 quarts 5 to 6 quarts 1 quart
Nectarines	Lug (24 to 28 lbs.) 18 pound flat box 2 to 3 lbs.	9 to 12 quarts 6 to 9 quarts 1 quart

Wipe off any particles of food on the rims or threads of the jars, or on the rubber rings with a clean, damp cloth.

Place the lids on the jars. (1) Partly seal jars having rubber rings. If a glass lid or zinc cap is used, have the wet rubber ring in place on the lid or jar according to the type. With a screw band over a glass lid, or with a zinc cap, screw the band or cap on and turn back about a quarter turn for the band; less for the zinc cap. (2) Seal the jars completely if using metal lids that have sealing compound. (3) With the lightning-type jar, leave the short wire up.

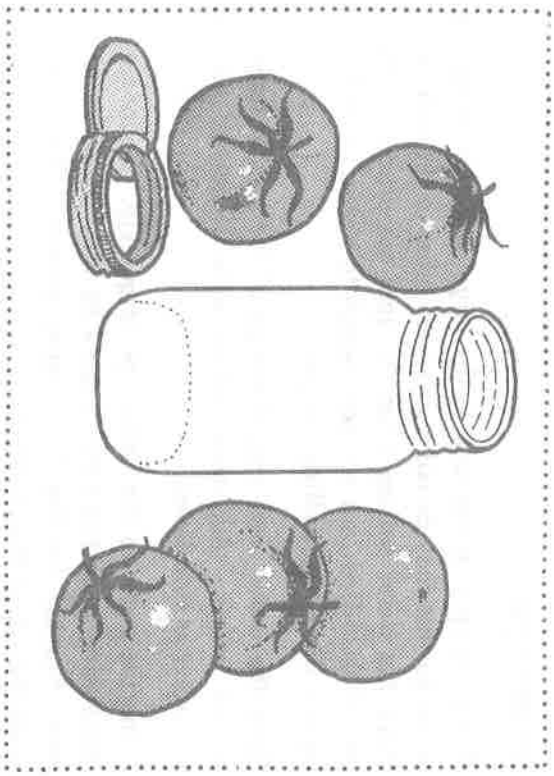
If tin cans have been filled with cold fruit, exhaust the air from them before sealing. Stand without lids in boiling water up to two inches of their tops and boil for ten minutes or more. Seal tin cans before processing by placing a lid on each can and using a can sealer.

TO PROCESS

Place the jars on the rack in the large container of very hot water so that they do not touch each other or the side walls. Have the water boiling when the jars are placed in the water, if the filled jars are hot enough to permit it and if you have a lifter for handling the jars.

Have the water come over the tops of the jars at least one or two inches. Add more boiling water if needed to keep the water at this level.

Bring the water to the boiling point quickly. Count time of processing after the water begins to boil. Process for the time directed for the food being canned. Boil steadily. Keep the lid on the container.



TO REMOVE AND SEAL JARS

Use a lifter made for this purpose, or ladle off water until enough of the upper part of the jar is exposed so that the jar may be grasped with a cloth holder.

If a metal basket is used instead of a rack to hold the jars in the boiling water, the basket and jars may be lifted out together.

Remove the jars immediately after processing them. Do not set on a cold surface or in a draft. Plunge tin cans into cold water. Do not open a jar to replace lost liquid. Seal immediately jars with rubber rings. The bands over the lids having sealing compound were screwed on completely before processing. Do not attempt to seal further.

* For 2-quart jars increase the times by one-half.

** Lengths of time for processing in boiling water are for altitudes from sea level to 1,000 feet. For higher altitudes, add 1 minute for each 1,000 feet, when the processing time is 20 minutes or less. Add 2 minutes for each 1,000 feet when the processing time is longer.

*** LYE-PEELING OF CLINGSTONE PEACHES. Lye-peeled peaches should be canned at once or stored in cold diluted brine to prevent darkening. To prepare the lye solution, use an iron, stainless steel, or graniteware kettle (not aluminum). Make a solution of 6 tablespoons concentrated lye and 2 gallons COLD water. Put lye into cold water and stir with a wooden spoon, (lye spatters when added to hot water). Bring to a boil. Place a few of the peaches at a time in a wire basket, sieve, or thin cloth tied as a bag, and immerse them into boiling lye solution. Or, slip them directly into the lye solution; be careful to avoid spattering.

Let the peaches stand from 30 to 60 seconds or until the skins are loosened and partly dissolved. As you remove the sieve or strainer full of peaches to the sink, be careful that no liquid drips onto the floor or other surfaces. Or, transfer the peaches from the lye solution to a container that is not made of aluminum; use a wooden spoon, or stainless steel dipper. Rinse the peaches thoroughly under a strong stream of cold water from the faucet, washing the skins away.

Dispose of the lye solution as soon as the peeling is finished. Carefully pour the solution down the sink drain and rinse the sink with large amounts of cold water. Or, dispose of the solution in the toilet and flush several times.

FRUIT	HOW TO PREPARE	GLASS JARS		CANS	
		PTS.	QTS.*	No. 2	No. 2½
Tomatoes	Wash. Sort, picking out any that are spoiled or green. Dip in boiling water long enough to crack skins, about 1 minute. Dip in cold water. Peel and remove cores. Save any juice to add to the tomatoes when heating.				
	To Pack Hot: Bring whole peeled tomatoes to a boil. Pack immediately into hot jars. Cover with the hot liquid in which the tomatoes were heated. Add 1 teaspoon salt to each quart. Adjust lids ..... Process	15	15	15	15
	To Pack Raw: Pack raw whole, peeled tomatoes tightly to the tops of hot jars. Press the tomatoes down after each 2 tomatoes are added, to release juice and to fill spaces. Add 1 teaspoon salt to each quart. Adjust lids..... Process	50	50	50	55

To Can Fruits and Tomatoes

Use a boiling-water bath. See method given on page 6. Prepare jars, lids, and rubber rings as directed on page 4.

1. Choose sound fruit, fresh, firm, and ripe, but not overripe or soft. Can fruit while it is fresh. Sort for size and ripeness.
2. Prepare just enough to fill the canner each time. Wash the fruit well, lifting it out of the water used. Do not bruise.
3. The fruit may be canned in fruit juice, in water, or in syrup. Allow about ½ cup of liquid to each pint jar; ¾ to 1 cup to each quart jar.
4. There are two ways to combine the fruit and liquid:
   Packed raw – Put the fruit in the hot jar uncooked. Bring the liquid to a boil and pour it over the fruit.
   Packed hot – Bring the fruit to a boil in the liquid, or cook it for a short time. Pack it hot in the jar. Cover with the hot liquid.
5. Prepare the fruit as directed in the table. Fill the jars, leaving head space as directed in table on page 13.
6. Adjust the lids, process, and remove and seal the jars as directed in "To Can in a Boiling-Water Bath," page 6.
7. Cool, test, label, and store the jars as directed on page 5.

TO SWEETEN FRUIT

Sugars improve the flavor of fruits low in sugar or high in acid. They help to keep the shape and the natural flavor and color of the fruit. The source of the sugar may be beet or cane sugar, honey, corn syrup, or fruit juice.

If fruit is canned unsweetened, state it on the label. To sweeten, pour off liquid when the jar is opened. Add sugar or other sweetening to this liquid. Combine with the fruit.

SYRUPS (beet or cane sugar)

Bring the sugar and water or juice to a boil.
Light syrup -- 1 cup sugar to 3 cups water or juice.
Medium-light syrup -- 1 cup sugar to 2 cups water or juice.
Medium syrup -- 1 cup sugar to 1 cup water or juice.

HONEY

For medium-light syrup, replace 1/3 of the sugar with an equal volume (cup for cup) of honey. For light syrup more of the sugar may be replaced by honey, cup for cup.

CORN SYRUP

For a syrup similar in thickness to the sugar syrup, replace sugar with the same volume of corn syrup. For similar sweetness, 2 cups of corn syrup are equal to about 1 cup of the cane or beet sugar. Corn syrups vary greatly.

JUICE

Use fruit that is soft but sound and juicy. Crush and heat over low heat. Strain.

Acid Canning of Vegetables*

Use jars no larger than 1 quart. Preferably use pint jars and glass lids. Prepare jars, lids, and rubber rings as directed on page 4.

1. To prepare the acid solution:
   2 quarts water
   1 tablespoon salt
   1½ cups lemon juice (¾ pint or 12 fluid ounces), strained through washed cheesecloth
   or 2-2/3 cups (21 fluid ounces) vinegar of 4 per cent acidity
   or 2 cups (1 pint) vinegar of 5 per cent acidity

* By W. V. Cruess

Plums	Sort, remove stems, and wash. If canned whole, pricking helps prevent bursting. Or, cut in halves.			
	To Pack Hot: Heat to boiling in juice, or in a thin to medium syrup. Pack hot. Cover with boiling liquid. Adjust lids..... Process	15	15	20
	To Pack Raw: Pack the fruit into the jar. Cover with boiling juice or syrup. Adjust lids..... Process	20	20	15 20
Prunes, fresh	Leave whole if small in size, or if large, cut in halves and remove pits. Peel if skin is tough. Pricking whole fruit helps prevent checking. Cover with boiling syrup.			
	To Pack Hot: Same as plums..... Process	15	15	15 20
	To Pack Raw: Same as plums..... Process	20	20	15 20
Rhubarb	Cut into ½ inch lengths. Add ½ cup sugar to each quart of rhubarb and let stand to draw out juice. Bring to boil. Pack hot. Cover with hot juice. Adjust lids..... Process	10	10	Not recommended
Strawberries	Not recommended because product is not satisfactory usually.			

FRUIT	HOW TO PREPARE	GLASS JARS		CANS	
		PTS.	QTS.*	No. 2	No. 2½
Peaches (cont'd)	**To Pack Hot:** If fruit is juicy, add ½ cup sugar to each quart of raw fruit. Heat to boiling. For less juicy fruit, drop into thin medium syrup, boiling hot, and just heat through. Pack hot. Cover with boiling liquid. Adjust lids.				
	.....Process Clingstone peaches	20	25	20	25
	.....Process Freestone peaches	15	20	15	20
	To Pack Raw: Pack in jars with the cut side down and the edges overlapping. Cover with boiling liquid.				
	Adjust lids.....Process Clingstone peaches	25	30	30	35
	Adjust lids.....Process Freestone peaches	20	25	25	30
Pears	Pears for canning are ripened after picking. Do not allow to become too soft. Pare, cut in halves, and trim out cores.				
	To Pack Hot: Same as less juicy peaches.....Process	15	20	15	20
	To Pack Raw: Same as peaches .....Process	20	25	25	30

For peas, use more acid – see below. Use vinegar of any well-known brand that is labeled and sealed. Purchase at the grocery store. Do not use homemade vinegar, because it may not contain sufficient acid.

Use a standard measuring cup to measure the lemon juice or vinegar. Do not use less than the amount specified.

For peas, use 2 cups (1 pint) of the lemon juice, or 3 cups (1½ pints) of vinegar of 5 per cent acidity, or 2 pints of vinegar of 4 per cent acidity. (Three or four tablespoons of sugar may be added to improve the flavor of peas.)

2. Place the prepared vegetables in a pan. Cover well with the acid liquid, or use about 1½ cups of the liquid to 1 pound of prepared vegetables.

3. Boil over direct heat for 5 to 10 minutes. Count time when boiling begins. In filling the jars, be careful not to pack tightly. Pack the vegetable boiling hot in hot jars. Cover with liquid in which the vegetable boiled. Have it boiling hot. Fill the jars to within ½ inch of the top, adding more acid liquid if necessary. In filling a jar with corn, lima beans, or peas, leave a space of 1 inch or more above the vegetable. Cover with the acid liquid to within ½ inch of top.

4. Partly seal jars having glass lids. If metal lids having sealing compound are used, completely seal the jars. See "To Can in a Boiling-Water Bath," page 6.

5. Process pint jars for 60 minutes in a boiling-water bath; quart jars for 75 minutes. Cool, test, label, and store jars as directed on page 5. If at the end of the processing period, any jar has lost 1½ inches of liquid, or more, open the jar immediately and use the product.

6. At altitudes above 1,000 feet, add 2 minutes for each 1,000 feet.

TO USE THE VEGETABLES

Before tasting or using, boil the vegetable as directed on page 25, "Beware of Botulism," step 3. Use in salads or in other ways. If too sour, add a little baking soda (on the very tip of a teaspoon) during the boiling; avoid using too much soda. Use soda only after opening the jar for use, not at the time of canning.

SELECT THESE VEGETABLES

Artichokes, asparagus, beets, carrots, celery, lima beans, peas, peppers, string beans, and summer squash are best suited to acid canning. Beans or corn may be combined with tomatoes, but the acid must also be added and used as directed. Corn by itself has a poor flavor by this method. Greens such as spinach and mustard greens are difficult to can by this method; if canned, pack loosely and cover well with the acid liquid.

PREPARATION

Use fresh vegetables directly from the garden. Wash well, lifting out of each water used. Prepare them as for canning: snip green bean pods; shell peas; cut asparagus to length of jar or can; trim artichokes and remove outer leaves (bracts); peel and dice carrots and beets; trim and thoroughly wash spinach and other leafy vegetables; and precook corn on the cob 10 minutes in boiling water and cut it from the cobs. Cut summer squash into dice; flat pieces may mat and slow down the rate of heating.

Nectarines Same as freestone peaches.

Peaches To peel (all except canning varieties of clingstones***) dip in boiling water for about a minute, plunge into cold water, and slip off skins. Cut into halves and remove pits. To keep from darkening, dip in a gallon of water containing 2 tablespoons each of salt and vinegar; drain at once. Clingstone peaches may be peeled like apples, preferably with a stainless steel knife, or may be dipped into a lye solution*** until the skins loosen. When a bushel or more of clingstone peaches is being prepared, lye-peeling saves time. Once peeled, a cut around the peach and a twisting motion between the hands will remove one half of the fruit from the pit. The pit may be removed from the second half with a special spoon-shaped knife made for this purpose, or can be cut out carefully with a paring knife. Before proceeding, read carefully the section on page 20, "Lye Peeling of Clingstone Peaches."

FRUIT	HOW TO PREPARE	GLASS JARS		CANS	
		PTS.	QTS.*	No. 2	No. 2½
Grapefruit	Use thoroughly ripened fruit. Peel. Separate segments and peel them. Pack segments in jars. Cover with syrup at 190°F. Process in water at a temperature of 190°F. Adjust lids. ..... Process	30	35	30	35
Grapes	Use ripe Muscat or slightly underripe Thompson Seedless grapes for canning. Remove from stems and wash. **To Pack Hot:** Bring to a boil in a small amount of liquid. Pack hot. Cover with the hot liquid. Adjust lids. ..... Process	15	15	15	15
	To Pack Raw: Put into hot jars. Cover with boiling liquid. Adjust lids ..... Process	20	20	20	20

To Can Fruits and Tomatoes in a Boiling-Water Bath (212 F°)

FRUIT	HOW TO PREPARE	GLASS JARS		CANS	
		Process		Process**	
		PTS.	QTS.*	No. 2	No. 2½
	Fill quart or smaller jars to within ½ inch of tops; 2-quart jars to within 1 inch of tops. Fill tin cans with solids to ¼ inch from the tops and with liquid to 1/8 inch of the tops.	Minutes		Minutes	
Apples	Pare, cut in halves or quarters, and trim off core. To keep from darkening, dip in a gallon of water containing 2 tablespoons each of salt and vinegar. Cook in hot liquid for 2 to 4 minutes, according to the variety. Pack hot. Cover with hot liquid. Adjust lids ..... Process	15	15	10	15
Applesauce	Make with or without sweetening. Pack boiling hot in hot, scalded jars. Adjust lids ..... Process	10	10	10	10

FRUIT	HOW TO PREPARE	GLASS JARS		CANS	
		PTS.	QTS.*	No. 2	No. 2½
Apricots	Choose firm, well-colored apricots, not overripe. To peel, dip in boiling water for 1 minute, plunge into cold water, and peel. Or, can apricots without peeling. Leave whole, or cut in halves and remove pits.				
	To Pack Hot: Bring to a boil in liquid and just heat through or cook for about 1 to 3 minutes. Pack hot; cover with hot liquid. Adjust lids. Process	20	20	15	20
	To Pack Raw: Fill the jars with uncooked apricots. Cover with boiling liquid. Adjust lids. Process	25	30	25	30
Berries other than strawberries	Drain well after washing. For firm berries, add ½ cup sugar to each quart of fruit, cover pan, bring to a boil, and shake pan to keep fruit from sticking. Pack hot; cover with hot liquid. Adjust lids. Process	10	10	10	10
	For red raspberries and other soft berries, fill jars with raw fruit and shake down for a full pack. Cover with boiling syrup made with juice or water (½ cup sugar and about ¾ cup juice for each quart). Adjust lids. Process	10	15	10	15
Cherries	Wash, remove stems, grade, and pit if desired. If left whole, pricking helps prevent splitting.				
	To Pack Hot: For pitted cherries, follow directions for firm berries. For cherries with pits, follow directions for firm berries but add a little water to prevent sticking. Or bring to a boil in hot syrup. Pack hot. Adjust lids. Process	15	15	15	20
	To Pack Raw: Pack in hot jars. Cover with boiling syrup or juice. Adjust lids. Process	20	25	20	25
Figs	Use tree-ripened figs, not overripe. Sort and wash. Bring to a boil in hot water. Let stand in the hot water 3 to 4 minutes. Drain. Pack hot in the hot jars. Add 1 tablespoon of lemon juice to each 1-quart jar. Cover with boiling liquid. (Do not use soda in preparing figs.) Adjust lids. Process	90	90	75	75

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HOME CANNING OF FRUITS AND VEGETABLES

Organisms that cause food spoilage—molds, yeasts, and bacteria—are always present in the air, water, and soil. Enzymes that may cause undesirable changes in flavor, color, and texture are present in raw fruits and vegetables.

When you can fruits and vegetables, you heat them hot enough and long enough to destroy spoilage organisms. This heating (or processing) also stops the action of enzymes. Processing is done in either a water bath canner or a steam pressure canner. The kind of canner that should be used depends on the kind of food being canned.

RIGHT CANNER FOR EACH FOOD

For fruits, tomatoes, and pickled vegetables, use a **water bath canner.** You can process these acid foods safely in gently boiling or simmering water.

For all common vegetables except tomatoes, use a **steam pressure canner.** To process these low-acid foods safely in a reasonable length of time takes a temperature higher than that of boiling water.

Steam pressure canner. For safe operation of your canner, clean petcock and safety-valve openings by drawing a string or narrow strip of cloth through them. Do this at beginning of canning season and often during the season.

Check pressure gauge. An accurate pressure gauge is necessary to obtain the processing temperatures needed to safely preserve foods. A dial gauge, old or new, should be checked for accuracy before the canning season, also during the season if the gauge has been dropped or damaged in any way.

A weighted gauge or pressure regulator needs to be thoroughly cleaned.

If your gauge is off by 5 pounds or more, the gauge should be replaced. If the gauge is not off by more than 4 pounds, you can correct for it as shown below. As a reminder, tie a tag on the canner stating the reading to use to get the correct temperature.

If the food is to be processed at 10 pounds steam pressure, and the gauge reads—

1 pound high, process at 11 pounds
2 pounds high, process at 12 pounds
3 pounds high, process at 13 pounds
4 pounds high, process at 14 pounds

Or if the gauge reads—

1 pound low, process at 9 pounds
2 pounds low, process at 8 pounds
3 pounds low, process at 7 pounds
4 pounds low, process at 6 pounds

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At higher elevations, use these corrections in addition to the corrections made for canning at higher elevations. See page 6.

Wash canner kettle well if you have not used it for some time. Don't put dial gauge in water; wipe it with a soapy cloth, then with a damp, clean cloth.

Water bath canner. Water bath canners are available on the market. The canner should have a cover and a wire or wooden rack. If the rack has dividers, jars will not touch each other or fall against the sides of the canner during processing. Any big metal container, however, may be used as a water bath canner if it is deep enough so that the water covers the tops of the jars. If a rack is not available, a folded cloth can be used to prevent direct contact of the jar with the bottom of the container.

If a steam pressure canner is deep enough, you can use it for a water bath. Cover or leave it uncovered, but do not fasten. If covered, leave petcock wide open so that steam escapes and pressure does not build up inside the canner.

Steam canners. Steam canners can be used in place of a water bath canner for acid fruits and pickles. In these canners the food is processed in flowing steam rather than immersed in water. These are not pressure canners and should be used only for acid foods. Use time schedules for water bath canning of acid fruits, tomatoes, and pickles.

Oven canning. This method is not recommended for any product. The jar may explode, or processing may be inadequate because the heat is unevenly distributed.

Oven canning is especially dangerous for low acid foods, because the temperature will not exceed the boiling point of the covering liquid, approximately 212°F. This is not adequate to destroy the heat-resistant organisms that cause botulism.

Open kettle. Never use this method for low acid vegetables, meat, poultry, or fish, because the heat is not sufficient to destroy heat-resistant organisms that cause botulism.

For acid fruits, this method may result in a higher rate of spoilage and seal failure.

In this method, the food is cooked completely in an ordinary kettle and packed hot into clean, hot jars which are sealed immediately. This method is suitable for some fruit juices of thin consistency. Heat the juice to 190°F., bottle hot, and seal at once.

GLASS JARS

Be sure all jars and closures are free of cracks, chips, dents, or rust; defects prevent airtight seals.

Mason-type jars made for home canning are recommended. Mayonnaise and similar jars may be used for home canning if the lid and ring band fit. These jars were not manufactured for heat processing and sometimes have a higher rate of breakage.

Select the size of lid, wide-mouth or regular, that fits your jars. Ring bands may be reused. Use new metal lids.

Wash glass jars in hot, soapy water and rinse. Wash and rinse lids and bands. Metal lids with sealing compound may need boiling or holding in boiling water for a few minutes. Follow the manufacturer's directions.

If you use rubber rings, have clean, new rings of the right size for the jars. Don't test by stretching. Wash rings in hot, soapy water. Rinse.

VEGETABLES

Preparation

Select fresh, firm, crisp vegetables. Prepare in small lots, enough to fill the pressure canner each time. Wash the vegetables. Prepare the vegetables according to the directions in the table beginning on page 4. In precooking for the hot-pack method, use a minimal amount of water. This water can be used as the covering liquid in the jars.

Canning without salt. It is not necessary to can vegetables with salt. It is added for flavor and sometimes helps retain texture.

Filling jars. There are two methods for filling the jars. One is the **raw pack,** where fresh, uncooked vegetables are packed into the jar, covered with water or brine, leaving the recommended head space, placed in the pressure canner, and heat processed. The raw pack is not recommended for some vegetables, because the rate of heat penetration is not uniform in these raw foods. The second method is the **hot pack,** where fresh vegetables are partially cooked, filled hot into hot jars, covered with hot water or brine, and heat processed. In either case do not overfill. Pack the food to the shoulder of the jar, leaving room for the covering liquid and recommended headspace.

After adding liquid to the recommended headspace, use a plastic knife or spatula to remove entrapped air bubbles on the inner side of the jars. Add more liquid if necessary.

Adjusting seals. With a clean, damp cloth or towel, carefully wipe the rim and threads of the jar. Place the clean lid on the rim of the jar and screw on ring band firmly, but do not overtighten. If tightened too much, the lids will not vent correctly resulting in lids buckling, loss of seal a day or two after processing, and possibly glass breakage during processing.

Processing Vegetables

Filling the canner. The pressure canner should be filled with 2 to 3 inches of hot water. Canners with weighted gauges that continually vent steam during the processing time require an additional inch or two of water, if the recommended process time is 60 minutes or more. This is to prevent the canner from going dry. Place jars on the rack so they do not touch the sides of the canner or each other.

If the canner is deep enough, a second layer of jars may be added. Use a rack to allow steam circulation and to prevent jars on upper layer from tipping.

Venting the canner. Securely fasten the pressure canner lid according to manufacturer's instructions. Leave the petcock or vent pipe open. Before processing the jars, drive all the air out of the canner by letting the steam escape. This is called venting. Place canner over medium high heat. Let a stream of steam escape for 7 minutes with a dial gauge and for 2 minutes with a weighted gauge or pressure regulator. If the air is not driven out, it prevents the temperature from rising as high as it should at a given steam pressure. Spoilage may result.

Processing. From the table on page 4, determine the recommended pressure and processing time for the product and the size of the jar. After venting the canner properly, close the petcock or put on the weighted gauge, and bring the canner to the recommended pressure which determines the safe processing temperature. When the recommended pressure is reached, start timing. Process for the length of time given in the table. Watch the pressure gauge during processing to be sure that the pressure never falls below the recommended level. With weighted gauge or pressure regulator, check manufacturer's instructions for maintaining recommended pressure.

Cooling the canner. After processing, turn off the heat. It's best not to move the canner. Do not place it on a cold surface. Wait 5 minutes after the pressure returns to zero before opening the petcock or the vent pipe closure. With a weighted gauge, the pressure has returned to zero when there is no longer a hissing sound when the gauge is nudged. In both cases, cooling the canner can take 30 to 45 minutes. Open the petcock before removing the cover of the canner.

Opening the canner. To remove the canner lid, lift the side farthest away from you first so the lid protects you from the steam.

Cooling, testing, and storing jars. Using a jar lifter, remove the jars from the canner. Bubbling in jars removed from the canner is a sign of a good seal; it means that the contents are boiling under vacuum.

Set the jars on a board, rack, or folded cloth, not on a cold surface. Leave space between the jars for air to circulate. After the jars are cool, remove the ring bands. To loosen a band that sticks, cover with a hot, damp cloth for 1 or 2 minutes. Look at the top of each jar. If the lid is slightly concave, it indicates a seal. Test the seal by pressing on the lid with your finger; the lid should not give. If you are not sure a jar is sealed, cautiously lift it by the lid after removing the ring band. If not properly sealed, the lid will come off.

Wash and dry screw bands or wipe the jars with a damp cloth. The bands may be replaced on the jars if desired. Label and date the jars, and store in a cool, dark, dry place.

Reprocessing. If a jar did not seal, refrigerate and use the food within a few days if it looks and smells all right, or reprocess it within 24 hours. Use a new metal lid and check the jar for flaws. Process by the method originally advised and for the full length of time. Although reprocessing affects food quality, the food will be safe to eat.

Before using vegetables. Properly canned vegetables can be safely eaten without heating. If there are any doubts about the safety of the processing method or the contents of the jar, thorough heating will destroy any botulinum toxin that may have been formed. Empty contents into a saucepan, bring to a boil, reduce to a simmer, and simmer 15 minutes, stirring occasionally. For more information see "Beware of Botulism" on page 11.

How to Process in Pressure Canner

The times and pressures given in the table are for sea level. For higher altitudes, use the times given, but increase the pressure 1 pound for the first 1,000-foot increase in elevation and ½ pound for each additional 1,000 feet. Check the manufacturer's high altitude instructions if canner has a weighted gauge.

Process at 10 pounds pressure (240°F). See page 6 for processing times at 15 pounds pressure (250°F). If the pressure drops below 10 pounds for longer than 5 minutes, time the cooking over again. If the pressure drop is for less than 5 minutes, process for an additional 10 minutes.

VEGETABLES	HOW TO PREPARE	PROCESSING TIME (10 pounds pressure)	
		Pint	Quart
		minutes	
Artichokes	Use small artichokes. Trim to 1¼ to 2 inches in length. Pre-cook 5 minutes in water to which ¾ cup of vinegar per gallon has been added. Drain. Pack hot into hot jars. Do not overfill. Cover with a boiling brine prepared by adding ¾ cup vinegar or lemon juice and 3 tablespoons salt to 1 gallon water. Fill to within ¾ inch of tops of pint or quart jars. Seal.	25	25
Asparagus	Sort, wash, and cut in lengths ¾ inch shorter than the jar or cut into 1 or 2 inch pieces. Cut off scales (bracts). Pre-cook in boiling water for 1 to 3 minutes to wilt. Then plunge quickly into cold water. **To pack whole:** Gather a bundle of stalks with the ends down and fill jar. Do not pack tightly. Add ½ teaspoon salt for pints, 1 teaspoon salt for quarts. Cover with boiling water to ¾ inch of top of jar. Seal. **To pack cuts:** Fill to ¾ inch from top of jar with cuts. Add ½ teaspoon salt for pints, 1 teaspoon salt for quarts. Cover with boiling water to within ¾ inch of top of jar. Seal.	28 28	32 32
Beans, dried kidney, etc.	**To pack hot:** Use any dried beans or peas. Soak in cold water for 12 to 18 hours in a cool place. Bring to a boil and boil 30 minutes. Pack into hot jars, leaving 1 inch headspace. Add ½ teaspoon salt to pints, 1 teaspoon for quarts. Cover with boiling water to 1 inch of top. Seal.	75	90
Beans, fresh lima	**To pack hot:** Proceed as directed for peas. Process as directed for lima beans. **To pack raw:** Use ½ teaspoon salt for pint jars; 1 teaspoon salt for quart jars. **Small beans:** Pack pint jars loosely to within 1 inch of tops; quarts to 1¼ inches. **Large beans:** Pack pint jars loosely to within ¾ inch of tops; quarts to 1¼ inches. Add salt. Fill to ¾ inch of top with boiling water. Seal.	40	50
Beans, string	Sort and snip or string if necessary. Use ½ teaspoon salt for pint jars; 1 teaspoon salt for quart jars. For mature beans, see *Peas, mature.* **To pack hot:** Cut in 1 to 1½ inch lengths. Pre-cook in boiling water until pliable, about 2 to 5 minutes. Pack hot into hot jars. Add salt. Cover to within ¾ inch of jar tops with the boiling liquid in which the beans were pre-cooked. Add boiling water if needed. Seal. If beans are left whole, pack beans standing on ends. Seal. **To pack raw:** Cut into 1-inch pieces. Pack tightly to within ¾ inch of jar tops. Add salt. Cover with boiling water to within ¾ inch of top. Seal.	20 25 20	25 30 25
Beets	**To pack hot:** Leave on roots and 1 to 1½ inch of stems. Boil until skins slip off (about 15 minutes). Dip in cold water. Peel, trim, and slice. Discard woody beets. Reheat in small amount of water. Pack hot into hot jars. Add ½ teaspoon salt to pint jars; 1 teaspoon salt to quart jars. Cover to within ½ inch of jar tops with the boiling liquid in which the beets were reheated. Add boiling water if needed. Seal. *Raw packing of beets is not recommended.*	35	40
Carrots	**To pack raw:** Wash and scrape or peel. Pack cold, sliced, or asparagus style to within 1 inch of tops of pint or quart jars. Add ½ teaspoon salt to pint jars; 1 teaspoon salt to quart jars. Add boiling water to within ¾ inch of top. Seal.	30	30
Celery	Prepare and slice. Use ½ teaspoon salt for pint jars; 1 teaspoon salt for quart jars. **To pack hot:** Pre-cook 1 to 3 minutes depending on size and tenderness. Pack hot into hot jars. Add salt. Cover to within ¾ inch of jar tops with boiling liquid in which the celery was pre-cooked. Add boiling water if needed. Seal. **To pack raw:** Slice or cut asparagus style. Pack loosely to within ¾ inch of jar tops. Add salt. Cover with boiling water to within ¾ inch of tops. Seal.	35 30	35 30
Corn, whole kernel	**To pack hot:** Can very soon after harvest. Use a sharp knife to cut raw corn from cob to two-thirds of the total depth of the kernels. Do not scrape the cobs. Cover well with brine (1 level tablespoon salt to 1 quart water). Heat to boiling point. Pack hot into hot jars to within 1 inch of jar tops. Seal. *Raw pack is not recommended.*	55	70
Corn, cream style	**To pack hot:** Prepare as for whole kernel corn, but scrape the cobs (do not scrape off any of the cob material). Proceed as directed for whole kernel corn. Leave 1¼ inch headspace. *Quart jars are not recommended.* Seal. *Raw pack is not recommended.*	85	not rec.

VEGETABLES	HOW TO PREPARE	PROCESSING TIME (10 pounds pressure)	
		Pint	Quart
		minutes	
Corn, hominy	Cover hominy well with brine, as directed for whole kernel corn. Heat to boiling point. Pack hot into hot jars to within 1 inch of tops. Seal. *Raw pack is not recommended.*	75	90
Greens	Spinach, swiss chard, beet greens, other greens. *Home canning is not recommended.*		
Mushrooms	NOTE: Trim stems and discolored parts. Rinse in cold water. Leave small mushrooms whole; cut larger ones into halves or quarters. Blanch in simmering hot water or steam for 4 minutes. Pack hot mushrooms into hot jars. Add ½ teaspoon salt and ½ teaspoon of lemon juice to pints. Add boiling cooking liquid or water to cover mushrooms, leaving ½ inch headspace. *Mushrooms will be overcooked if processed long enough to be safe.* Apply lids and ring bands.	30	Don't use
Okra	**To pack hot:** Use young, tender pods. Wash and trim. Leave pods whole or cut into 1-inch pieces. Boil for 1 minute. Pack hot into hot jars. leaving 1 inch headspace. Add ½ teaspoon salt to pints, 1 teaspoon to quarts. Add boiling water to 1 inch of top. Seal.	25	40
Onions, small white	Follow directions for artichokes.		
Peas, fresh green	**To pack hot:** Can only young, tender peas. Hull and pre-cook for 1 to 4 minutes in a small amount of water until the skins wrinkle. Pack hot into hot jars to within 1¼ inches of tops. Add salt. Cover to within 1 inch of jar tops with the boiling liquid in which the peas were cooked. Add boiling water if needed. Seal.	40	45
	To pack raw: Pack loosely to within 1 inch of jar tops. Add ½ teaspoon salt for pint jars; 1 teaspoon salt for quart jars. Cover with boiling water to within 1 inch of top. Seal.	40	45
Peas, fresh black-eye	**To pack hot:** Follow directions for green peas. *Raw pack is not recommended.*	50	55
Peppers, bell-green, red and pimento	**To pack hot:** Cut out the stem end of each pepper, and remove the core and seeds. Peel peppers by heating in a gas flame or roasting in a very hot oven until the skins separate. Chill at once in cold water. Pack into jars. Cover with boiling water to within ½ inch of jar tops. Add ½ teaspoon salt to pint jars; 1 teaspoon salt to quart jars. It is also necessary to add 1½ teaspoons bottled lemon juice to pint jars; 1 tablespoon lemon juice to each quart jar. *(Process at only 5 pounds pressure; higher pressures affect texture and flavor.)* Seal.	(5 lb pressure) 50	60
Potatoes, new	Peel new potatoes. Leave small ones whole; cut larger ones in halves. Pack cold without pre-cooking. Add boiling brine made with 1½ to 2 tablespoons salt to 1 quart water. Fill to within ¾ to 1 inch of jar tops. Seal.	35	40
Potatoes, sweet	Wash and remove any blemishes. **To pack dry:** Place in steamer over boiling water or boil in a small amount of water until crisp-tender. Peel and cut into pieces. Pack tightly into jars, pressing to fill spaces. Add no salt or liquid. Apply lids and ring bands.	65	95
	To pack wet: Steam or boil as for dry pack, but remove as soon as skins slip off easily. Peel, cut into pieces, and pack hot into jars to within 1 inch of tops. Add ½ teaspoon salt to quarts. Cover with boiling water or a syrup of 1 part sugar to 2 parts water, leaving ¾ inch headspace. Apply lids and ring bands.	55	90
Pumpkin or mature squash, cubed	**To pack hot:** Wash, remove seeds, and peel. Cut into 1-inch cubes. Add enough water to cover; bring to a boil. Pack hot cubes to ½ inch of the top. Add ½ teaspoon salt to pints; 1 teaspoon to quarts. Cover with hot cooking liquid, leaving ½ inch headspace. Seal. *Raw pack is not recommended.*	55	90
Pumpkin or mature squash, strained	Scrape out fibrous material and cut flesh and rind into strips. Boil in water, or steam, until flesh is soft. Scrape flesh from rind and press through a colander. Bring to a boil. Pack hot into hot jars to within ¾ to 1 inch of tops. Add ½ teaspoon salt to pint jars; 1 teaspoon salt to quart jars. Seal. *Raw pack is not recommended.*	85	115

VEGETABLES	HOW TO PREPARE	PROCESSING TIME (10 pounds pressure)	
		Pint	Quart
		minutes	
Squash, summer crookneck, zucchini, pattypan	*Canning summer squash produces a soft to mushy product.* Wash and trim ends; do not peel. Cut into ½ inch-thick slices.		
	To pack hot: Put into a pan, add water to just cover, and bring to boiling. Pack hot into hot jars, filling loosely up to jar shoulders. Add ½ teaspoon salt to pints, 1 teaspoon to quarts. Cover with boiling cooking liquid, leaving ½ inch headspace. Apply lids and ring bands.	30	40
	To pack raw: Pack slices tightly into jars to within 1 inch of tops. Add salt as for hot pack, then fill jars with boiling water, leaving ½ inch head space. Apply lids and ring bands.	25	30
Turnips	Follow directions for carrots.		

PROCESSING TIMES AT 15 POUNDS PER SQUARE INCH AT VARIOUS ALTITUDES FOR PINT AND QUART MASON JARS PROCESSED IN 12-, 16-, OR 21-QUART PRESSURE CANNERS (HOT OR COLD PACK PROCEDURE).

PRODUCT*	PROCESSING TIME (minutes) AT ALTITUDES—		
	Less than 3,000 feet	3,000 to 7,000 feet	Over 7,000 feet
Asparagus	15	25	35
Beans, lima	30	60	85
Beans, snap or wax	15	30	45
Beets, whole or sliced	15	30	45
Carrots	15	30	45
Corn, whole kernel	50	90	135
Mushrooms	20	40	60
Okra	15	30	45
Parsnips	15	30	45
Peas, green	30	60	85
Peas, black-eye	30	60	85
Potatoes, new-whole	20	40	60
Rutabagas, sliced or diced	30	60	85
Squash, cubed	20	40	60
Sweet potatoes	50	90	135
Turnips, cubed	15	30	45

*Processing times at 15 pounds per square inch have not been established for all vegetables.

Preparation

Choose sound fruit that is fresh, firm, and ripe, but not overripe or soft. Wash fruit and sort for size and ripeness. Prepare just enough fruit to fill the canner each time.

Use fruit juice, water, or syrup for canning fruits. Allow about ½ cup liquid for each pint jar, ¾ to 1 cup for each quart jar.

Sweetening

Sugar improves the flavor of fruits low in sugar or high in acid. It also helps preserve the shape, natural flavor, and color of the fruit. For sweetening, you can use beet or cane sugar, honey, corn syrup, or fruit juice.

Artificial sweeteners are not suitable for canning. Saccharin turns bitter when heated. Aspartame loses its sweetness when heated.

It is safe to can fruit with water as a covering liquid. To artificially sweeten, add saccharin or aspartame just before serving.

Beet or cane sugar. Bring sugar and water to a boil.

Light syrup: 1 cup sugar to 3 to 4 cups water.
Medium-light syrup: 1 cup sugar to 2 cups water.
Medium syrup: 1 cup sugar to 1 cup water.

Honey. Honey can replace all or part of the sugar in syrups. Strong flavored honeys will overpower the flavor of the fruit.

Corn syrup. Corn syrup can be used instead of sugar, but the covering liquid will be less sweet. Sugar and corn syrup mixtures can also be used.

Juice. Crush fruit that is soft but sound and juicy. Heat over low heat. Strain. Sweeten if desired. Commercially prepared fruit juices can also be used. White grape juice works especially well.

Packing Fruit in Jars

To pack raw. Tightly pack uncooked fruit into hot, clean jars. Cover with boiling liquid, leaving ¼ inch headspace. Remove bubbles with plastic knife or spatula. Adjust seals.

To pack hot. Bring fruit to a boil in covering liquid, or cook it a short time. Pack hot into jars. Cover with the hot liquid, leaving ½ inch headspace. Remove bubbles and adjust seals.

Processing

Place the filled jars on the rack in the water bath. Cover the tops of the jars with water.

Quickly bring the water to a hard simmer or gentle boil after the jars are in place. Count the processing time, beginning when the water returns to a gentle boil. Process fruits for the times directed in the table, page 8. At altitudes above 3,000 feet, add 2 minutes processing time in gently boiling water bath for each additional 1,000 feet. No additional time is necessary at higher elevations if required processing temperatures can be reached. Use a thermometer.

Remove jars from the container immediately after processing. Use a lifter made for this purpose, or ladle off water until enough of the jar is exposed so that you can grasp it with a cloth holder. If you used a metal basket to hold the jars in the gently boiling water bath, lift out the jars and basket together.

Cooling, Testing, and Storing Jars

See instructions for cooling and testing on page 3.

Reprocessing. See instructions for reprocessing on page 3.

Canning Fruit in a Water Bath Canner

Fill quart or smaller jars to within ½ inch of tops; 2-quart jars to within 1 inch of tops. Increase the processing time by 10 minutes for 2-quart jars. Process fruits, tomatoes, and tomato juice in a simmering to gently boiling water bath, 180° to 210°F. Use a meat or candy thermometer to check water bath temperature. Start to count time when processing temperature is reached.

FRUIT	HOW TO PREPARE	PROCESSING TIME	
		Pint	Quart
		minutes	
Apples	Pare, cut in halves or quarters, and trim off core. To keep from darkening, dip in 1 gallon water that contains 2 tablespoons each of salt and vinegar. Drain. Cook in hot syrup for 2 to 4 minutes, according to the variety. Pack hot. Cover with hot liquid. Seal.	15	15
Applesauce	Wash, pare, if desired, quarter and core cooking apples. Simmer, covered, in a small amount of water until tender. Press through sieve or food mill. Sweeten if desired. Reheat to boiling and pack into hot jars. Add 1 tablespoon lemon juice to top of each jar. Seal.	20	20
Apricots	Choose firm, well-colored apricots that are not overripe. To peel, dip in boiling water for 1 minute, then plunge into cold water and peel, or can apricots without peeling. Leave whole, or cut in halves and remove pits. **To pack hot:** Bring to a boil in liquid and just heat through or cook about 1 to 3 minutes. Pack hot and cover with hot liquid. Seal. **To pack raw:** Fill the jars with uncooked apricots. Cover with boiling liquid. Seal.	20 25	20 30
Berries other than strawberries	Drain well after washing. For firm berries, add ½ cup sugar to each quart of fruit. Cover pan, bring to a boil and shake pan to keep fruit from sticking. Pack hot and cover with hot liquid. Seal. For red raspberries and other soft berries, fill jars with raw fruit and shake down for a full pack. Cover with boiling syrup made with juice or water (½ cup sugar and about ¾ cup juice for each quart). Seal.	10 10	10 15
Cherries	Wash, remove stems, sort for size and ripeness, and pit if desired. If left whole, prick to help prevent splitting. **To pack hot:** For pitted cherries, follow directions for firm berries. For cherries with pits, follow directions for firm berries but add a little water to prevent sticking or bring to a boil in hot syrup. Pack hot. Seal. **To pack raw:** Pack into hot jars. Covering with boiling syrup or juice. Seal.	15 20	15 25
Figs	Use tree-ripened figs that are not overripe. Sort and wash. Bring to a boil in hot water. Let stand in the hot water for 3 to 4 minutes. Drain. Pack hot into hot jars. Add 1 tablespoon of lemon juice to each 1-quart jar. Cover with boiling liquid. Do not use baking soda in preparing figs. Seal.	90	90
Fruit juices	Wash, remove pits, if desired, and crush fruit. Heat to simmering to release juice. Strain through a cloth bag. Some fruits are not normally heated before extracting the juice. Fruits not heated are apples, white cherries, grapefruit, white grapes, lemons, and oranges. (Navel orange juice will be bitter and is not recommended for canning.) Sweeten juice to taste. Immediately heat or reheat juice to simmering. **To pack hot:** Fill hot jars with hot juice to ½ inch of top. Seal.	15	15
Grapefruit	Use thoroughly ripened fruit. Peel. Separate segments and peel them. Pack segments in jars. Cover with hot syrup. Seal.	20	25
Grapes	Use ripe Muscat or slightly underripe seedless grapes for canning. Remove stems and wash. **To pack hot:** Bring to a boil in a small amount of liquid. Pack hot into hot jars. Cover with the hot liquid. Seal. **To pack raw:** Put into hot jars and cover with boiling liquid. Seal.	15 20	15 20
Nectarines	Follow directions for freestone peaches.		
Nopales	Remove spines from young, tender cactus leaves. Cut into cubes or strips. Diced or cubed cactus is easier to handle, but either strips or cubes may be used. Rinse diced cactus once or twice in cold water. Place diced cactus in water, bring to a boil, and turn down to simmer. Cook until tender, about 10 to 15 minutes. **To pack hot:** Pack hot into clean jars. Add ½ teaspoon salt and 1 teaspoon lemon juice or vinegar per pint; 1 teaspoon salt and 2 teaspoons lemon juice or vinegar per quart. Add other spices (garlic, cloves, or onion powder, for example) if desired. Cover with water leaving ½ inch headspace. Seal.	15	20
Oranges	For Valencia or Mandarin oranges, follow directions for grapefruit. Other orange varieties are not recommended, because they become bitter.		

FRUIT	HOW TO PREPARE	PROCESSING TIME	
		Pint	Quart
		minutes	
Peaches	To peel all except canning varieties of clingstones,* dip in boiling water for about 1 minute, plunge into cold water, then slip off skins. Cut into halves and remove pits. To keep from darkening, dip in 1 gallon water that contains 2 tablespoons each of salt and vinegar. Drain at once. Peel canning varieties of clingstone peaches like you would apples, preferably with a stainless steel knife, or dip into a lye solution until the skins loosen. When preparing a bushel or more of clingstone peaches, lye peeling saves time. Once peeled, a cut around the peach and a twisting motion between the hands will remove one-half the fruit from the pit. You can remove the pit from the second half with a special spoon-shaped knife or cut it out carefully with a paring knife. When canning lye-peeled cling peaches, add ½ teaspoon lemon juice per pint, 1 teaspoon per quart.		
	To pack hot: If fruit is juicy, add ½ cup sugar to each quart of raw fruit. Bring to a boil. Drop less juicy fruit into a medium-thin syrup that is boiling hot. Just heat through. Pack hot. Cover with boiling liquid. Seal.		
	Clingstone	20	25
	Freestone	15	20
	To pack raw: Pack in jars with the cut side down and the edges overlapping. Cover with boiling liquid. Seal.		
	Clingstone	25	30
	Freestone	20	25

***Peeling clingstone peaches with lye:** To prepare the lye solution, use a stainless steel or graniteware kettle, not aluminum. Put 6 tablespoons of household lye into 2 gallons of cold water. **Caution:** Lye spatters when added to hot water. Stir with a wooden spoon. Bring to a gentle boil. Place a few of the fruit at a time in a wire basket, sieve, or thin cloth tied as a bag, and immerse in the gently boiling lye solution, or slip fruit directly into the lye solution. Avoid spattering.

Let fruit stand 30 to 60 seconds or until the skins loosen and partly dissolve. Remove the sieve or strainer of fruit to the sink. Be sure that no liquid drips onto the floor or other surfaces, or transfer the fruit from the lye solution to a container. Do not use an aluminum container. Use a wooden spoon or stainless steel dipper. Rinse fruit thoroughly under a strong stream of cold water, washing the skins away.

Dispose of the lye solution as soon as the peeling is finished. Carefully pour the solution down the sink and rinse the sink with large amounts of cold water, or dispose of the solution in the toilet and flush several times.

Can lye-peeled fruit at once or store in cold, salt-vinegar solution brine (see under Peaches) to prevent darkening. Store lye in a tightly closed container out of the reach of children.

Antidotes for lye burns: If you receive burns from lye solution, apply vinegar, lemon, orange, or other acid fruit juice until lye appears to be neutralized.

If lye solution has been swallowed, follow these directions:

- Call the family physician.
- Administer egg white or milk by mouth.
- Do not induce vomiting.
- Combat shock by placing the affected person in a reclining position with the head lower than the body and wrap patient in blankets.

If the lye solution has been splashed into the eye, flush the eye in a stream of running water, bathe the eye with boric acid solution, and call the family physician.

Pears	Ripen pears for canning after picking. Do not allow them to become too soft. Pare, cut in halves, and trim out cores.		
	To pack hot: Same as for less juicy peaches. Seal.	15	20
	To pack raw: Same as for peaches. Seal.	20	25
Pineapple	Pare firm but ripe pineapple. Slice crosswise or cut into wedges. Remove the core and trim "eye." Simmer pineapple in light syrup or pineapple juice until tender.		
	To pack hot: Pack hot slices or wedges (spears) into hot jars. Cover with hot cooking liquid leaving ½ inch headspace. Seal.	15	20
Plums and fresh prunes	Sort, remove stems, and wash. If canning whole, prick to help prevent bursting, or cut into halves.		
	To pack hot: Bring to a boil in juice or in a thin to medium syrup. Pack hot. Cover with boiling liquid. Seal.	15	15
	To pack raw: Pack the fruit into the jar. Cover with boiling juice or syrup. Seal.	20	20
Rhubarb	Cut into ½-inch lengths. Add ½ cup sugar to each quart of rhubarb and let stand 3 to 4 hours to draw out juice. Bring to a boil. Pack hot. Cover with hot juice. Seal.	10	10
Strawberries	Not recommended because the product is usually not satisfactory.		

FRUIT	HOW TO PREPARE	PROCESSING TIME	
		Pint	Quart
		minutes	
Tomatoes	Sort, picking out any that are spoiled or green. Do not can overripe tomatoes. They may be too low in acid for safe water bath canning. (If tomatoes are excessively dirty, wash with a solution containing 4 teaspoons chlorine bleach in each gallon water.) Dip in boiling water long enough to crack skins (about 1 minute). Dip in cold water. Peel and remove cores. Save any juice to add to the tomatoes when heating.		
	To pack hot: Bring whole, peeled tomatoes to a boil. Pack immediately into hot jars. Cover with the hot liquid in which the tomatoes were heated. Add 1 teaspoon salt and 2 teaspoons vinegar or 2 teaspoons bottled lemon juice to each quart. Seal.	15	15
	To pack raw: Pack raw, whole, peeled tomatoes tightly to the tops of hot jars. Press tomatoes down after each two tomatoes are added to release juice and to fill spaces. Add 1 teaspoon salt and 2 teaspoons vinegar or 2 teaspoons bottled lemon juice to each quart. Seal.	30	30
	Hot pack without lemon juice or vinegar.	30	30
	Raw pack without lemon juice or vinegar.	45	45
Tomato juice	Use sound, well-ripened but not overripe tomatoes. Peel, core, and cut into pieces. Either cook until soft and strain juice or extract juice from uncooked tomatoes. Juice from cooked tomatoes is thicker and smoother. Juice from raw tomatoes is thin and watery and tends to separate. Immediately after extracting, heat juice to simmering. Fill hot jars to ½ inch of top. Add 1 tablespoon bottled lemon juice or vinegar to each quart. Add 1 teaspoon salt to each quart or salt to taste. Seal. Process in a gently boiling water bath.	15	15
Tomato juice cocktail	Extract juice as for tomato juice. For each quart, add 2 teaspoons salt, ½ teaspoon grated onion, 1 teaspoon grated celery, ½ teaspoon prepared horseradish, ⅛ teaspoon worchestershire sauce, and 2 tablespoons bottled lemon juice.		
	To pack hot: Same as for tomato juice.	15	15

QUESTIONS AND ANSWERS

Q. What causes the failure of jars to seal?

A. Seal failures may be due to chips, cracks, or defects in the jar rim, food particles on the jar lip, ring bands tightened too tight or not tight enough, insufficient heat to create a vacuum, or defective lids.

Q. Why is liquid sometimes lost from glass jars during processing?

A. Loss of liquid may be due to packing jars too full, fluctuating pressure in a pressure canner, or lowering pressure too suddenly.

Q. Should liquid lost during processing be replaced?

A. It is not necessary to refill with liquid. If refilled, the jar must be reprocessed. Loss of liquid does not cause food to spoil, though the food above the liquid may darken.

Q. Why does canned fruit sometimes float in jars?

A. Fruit may float because pack is too loose or syrup too heavy, or because some air remains in tissues of the fruit after heating and processing.

Q. What makes canned foods change color?

A. Darkening of foods at the tops of jars may be caused by oxidation due to air in the jars or by too little heating or processing to destroy enzymes. Overprocessing may cause discoloration of foods throughout the containers.

Pink and blue colors sometimes seen in canned pears, apples, and peaches are caused by chemical changes in the coloring matter of the fruit.

Iron and copper from cooking utensils or from water in some localities may cause brown, black, and gray colors in some foods.

When canned corn turns brown, the discoloring may be due to the variety of corn, to stage of ripeness, to overprocessing, or to copper or iron pans.

Packing liquid may dissolve coloring materials from the foods.

Q. Is it safe to eat discolored canned foods?

A. The color changes noted above do not mean the food is unsafe to eat; however, spoilage may also cause color changes. Any canned food that has an unusual color should be examined carefully before use.

Q. Why do the undersides of metal lids sometimes discolor?

A. Natural compounds in some foods corrode the metal and make a brown or black deposit on the underside of the lid. This deposit is harmless.

BEWARE OF BOTULISM

If you carefully follow the directions in this publication, there is little or no chance of spoilage in home-canned foods. Improperly canned food may cause a serious illness, a form of food poisoning called botulism. It can be fatal.

Botulism is caused by the toxin produced by growth of botulinum bacteria in foods that are low in acid or that have become low acid.

These low-acid foods include vegetables, meats, poultry, and fish. Acid foods include fruits, tomatoes, and pickles.

The botulism toxin is one of the most poisonous substances known. It can be completely destroyed, however, by cooking food as directed below.

Never taste any canned food about which there is doubt, that shows gas pressure in the jar, that is mushy or gassy in appearance, that is moldy, or that has a disagreeable odor. A sour, rancid, or putrid odor is a warning but it is not always present in poisonous food.

To help prevent botulism. Use a pressure canner that has an accurate gauge for canning all low-acid vegetables, meats, poultry, and fish. Do not process for less than the prescribed time.

If there is any doubt about the contents of the jar, do not taste the food. This applies to all home-canned, low-acid foods: vegetables, meats, poultry, and fish.

To cook home-canned, low-acid food, empty the food into a pan and place directly over the heat. Stir the food. Break up clumps. Bring to a boil, reduce to simmer, and simmer for 15 minutes at sea level and elevations up to 3,000 feet. Simmer greens and cream-style corn for at least 20 minutes at those altitudes. At altitudes above 3,000 feet, simmer the product for at least 20 minutes, because the boiling temperature of water decreases with the increase in altitude. If it is a close pack, such as spinach or a thick product, such as cream-style corn, simmer at least 30 minutes at altitudes above 3,000 feet. Add 5 minutes for each additional 1,000 feet.

Smell the product while simmering. The odor of botulism spoilage may not be detected in cold food. Any off-odor is made more noticeable by boiling. The odor is that of decomposition, usually somewhat putrid and cheesy or rancid.

It is not necessary to boil acid foods (fruits, tomatoes, and pickles) unless you suspect spoilage.

To dispose of spoiled food. Dispose of any food from a jar with a bulging or corroded lid, that has any liquid oozing from under the lid, that has a bad odor, a mushy or gassy appearance, or that is moldy.

Do not discard spoiled food any place where it may be eaten by poultry or other animals.

To discard questionable or spoiled food, boil the food, jar, lid, and screw band for ½ hour in a water bath. Then empty the contents of the jar into a pan. Be sure to put the jar, lid, and screw band in the same container. Lay the jar on its side. Fill the pan with a soap or detergent solution and boil for ½ hour. After boiling in suds or detergent, pour the liquid down the sink or in the toilet and flush several times. Discard the pieces of food in the garbage or in a garbage disposal.

Use a household bleach (four parts water and one part bleach) or rubbing alcohol to thoroughly rinse your hands and all articles that have come in contact with the questionable food. After carefully rinsing your hands, wash them thoroughly with soap and water.

If someone has tasted a questionable food, call the doctor at once, and immediately get in touch with the city, county, or state health department. In the meantime, keep the food and the jar in a place where there is no possibility of humans or animals tasting the food. Handle the food and container as little as possible. If the original jar, closure, and the food are available, keep them. If the food is still in the original container, keep it there. The food and jar are essential to the health department in checking for the presence of the botulinum toxin. Remember to wash your hands and other articles as directed.

YIELDS

Actual yields will vary depending on quality, condition, maturity, the way the produce is prepared, for example, whole, halves, slices, and whether it is packed raw or hot.

AMOUNT OF FRESH PRODUCE NEEDED FOR EACH QUART JAR.

PRODUCT	POUNDS
Fruit	
Apples	2½ to 3
Applesauce	2½ to 3½
Apricots	2 to 2½
Berries	1½ to 3
Cherries (unpitted)	2 to 2½
Figs	2 to 2½
Grapefruit	4 to 6 grapefruit
Grapes	4
Peaches, nectarines	2 to 3
Pears	2 to 3
Plums	1½ to 2½
Rhubarb	1 to 2
Tomatoes	2½ to 3½

AMOUNT OF FRESH PRODUCE NEEDED FOR EACH QUART JAR.

PRODUCT	POUNDS
Vegetables	
Asparagus	2½ to 4½
Beans, fresh lima in pods	3 to 5
Beans, string	1½ to 2½
Beets, without tops	2½ to 3½
Carrots, without tops	2 to 3
Celery	1½ to 2½
Corn, in husks	3 to 6
Peas, green, in pods	3 to 6
Potatoes, new	4 to 6
Pumpkin or mature squash	1½ to 3
Summer squash	2 to 4
Sweet potatoes	2 to 3

The authors are George K. York, Food Technologist, and Paulette DeJong, Staff Research Associate, Food Science and Technology, Davis.

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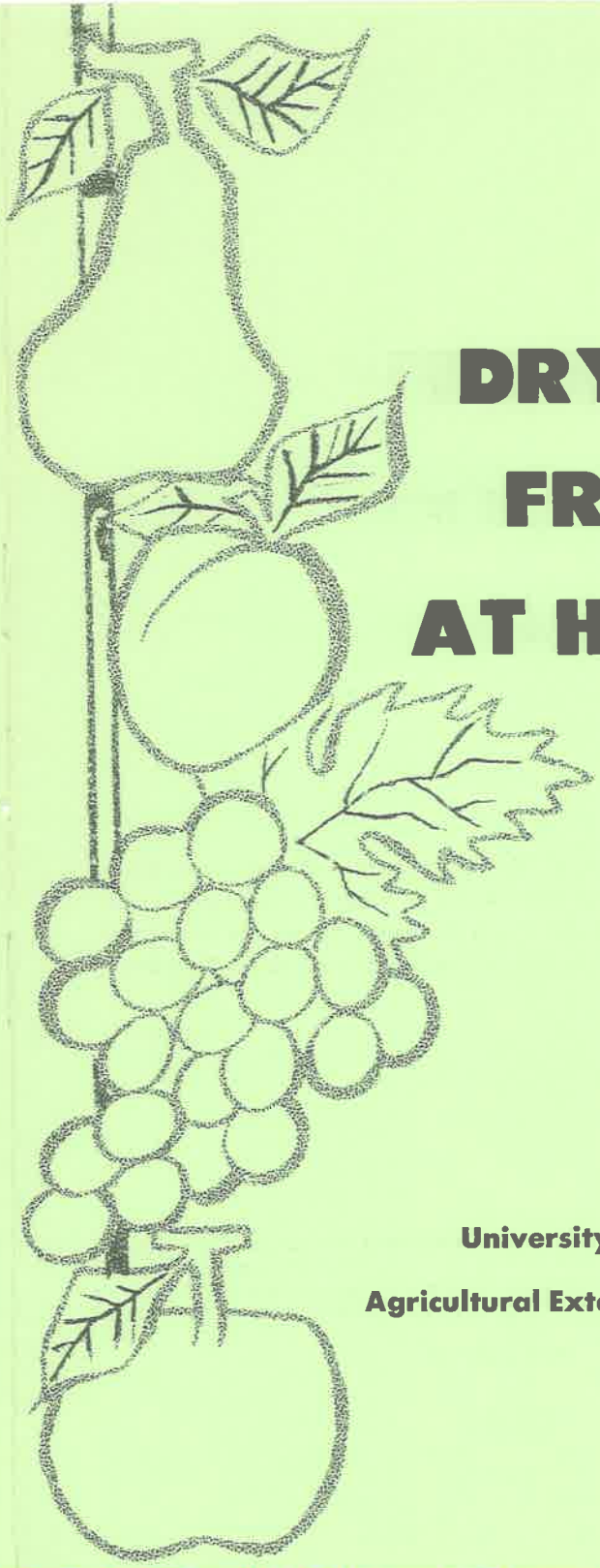

DRYING FRUITS AT HOME

University of California

Agricultural Extension Service

HXT–80

Sulfuring fruit does not prevent insect infestation. The best preventive is cold storage. Storage in home freezers will prevent insect development and also will maintain color and flavor quality.

The authors are Martin W. Miller, Associate Professor of Food Science and Technology and Associate Food Technologist in the Experiment Station, Davis; Frank H. Winter, Associate Specialist in the Experiment Station, Davis; and Christine Groppe, Extension Nutritionist, Berkeley.

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MAY 1966--5M

Oven-drying is not recommended for sulfured fruits because of the objectionable odor of the sulfur fumes. For oven-drying, use a rack that will separate the trays of fruit by about 2½ inches and leave about 1½ inches clearance from the oven walls and 3 inches top and bottom. Place the fan so a gentle flow of air circulates around the fruit in the oven during drying. Prop the oven door open to about 3 inches. To assure even drying, rotate the position of the trays. During the later stages of drying there may be a tendency for the fruit to scorch. If so, lower the temperature of the oven.

PACKAGING AND STORING

Correct storage of dried fruits is extremely important, as they are susceptible to attack by insects. As soon as the fruit is dry, pack it in scalded, dry, insectproof containers which are as nearly moistureproof as possible.

Suitable containers are small jars with well-fitting lids. They may be of crockery or glass. Jars used for home canning are very satisfactory.*

Freezer bags, tightly sealed, also are suitable. If fruits are packaged in cellophane, polyethylene, or saran bags, they must be kept in cold storage if they are to be stored for long periods, as insects can chew their way through these materials even when tightly sealed. Store the dried fruits in a dry, cool place away from light.

*On fruit that has been sulfured, do not use metal lids unless a cellophane or polyethylene sheet is placed under the lid.

DRYING FRUITS AT HOME

Drying is one of the oldest methods of preserving food. For successful drying, enough moisture must be removed from the fruit to prevent decay. In hot, dry climates, fruits will be reduced to a moisture level that preserves them in a few days. In any climate, however, you can create satisfactory drying conditions at a moderate expense by using artificial heat and circulating air over the fruit. Small amounts of fruit can be dried in your kitchen oven, using a small electric fan to circulate the air.

FRUIT PREPARATION

It is extremely important that you use only fresh, fully ripened fruit for drying. Fruit that is not suitable for eating fresh should not be dried, since fruit quality can be maintained but not improved during drying.

To prepare fruit for drying, sort and discard defective fruits. Wash, pit, and halve when necessary (as with stone fruits), and spread on trays in a single layer so the moisture will evaporate more quickly and uniformly.

PREDRYING TREATMENT

Most fruit will darken, lose flavor and vitamin C, and have an unappetizing appearance, if not treated immediately before drying. To prevent the chemical changes that cause these objectionable reactions, treat the fruit by sulfuring or by blanching in steam or hot water, or by a combination of these treatments.

Sulfuring

It is easy to sulfur cut fruit, and this treatment is most effective in maintaining quality during drying and storage. (See table for specific fruits.)

General instructions:

- Always sulfur outdoors.
- Use slatted wooden trays. Do not use aluminum or galvanized screening materials, as sulfur fumes corrode most metals.
- Spread fruits in a single layer, cut surface up.
- Stack trays with a 1½-inch separation, so that the sulfur fumes can circulate freely.
- Cover the stack of trays with a box that has no cracks or openings (plywood or even a heavy cardboard carton may

Blanching

Pretreating with steam or water produces a very fine product if properly done. This treatment may give a slight cooked flavor, particularly with pears, cling peaches, and apricots. Fruits may be steam blanched in a colander or strainer in a double boiler type of arrangement. (See table for preparation of fruit.)

When water blanching, place the whole fruits in enough boiling water to cover them (see table for times). The fruits are cut and pitted after blanching.

With either steam or water blanching, the skins may become loosened enough to peel off. The skins of freestone peaches, for example, may be slipped off easily after blanching. In commercial operations, skins usually are not removed because of the labor involved.

Drying

For sun-drying, remove the trays of sulfured or blanched fruit from the stack and place in a shadefree location to dry. The drying area should be relatively dustfree so the fruit remains clean. You may use a ground cover under the trays, such as a plastic or canvas sheet, weighted at the edges to prevent it from blowing onto the fruit. To protect the fruit from insects in the late afternoon or evening, place cheesecloth over the fruit but not in contact with it.

CAUTION: Lye attacks most metals and can cause serious burns to the body. Use rubber gloves when handling. If lye contacts the skin, wash immediately with water.

Under no circumstances should the lye solution come into contact with any metal other than stainless steel, as the lye will form salts that will change the flavor and color of the fruit and introduce a health hazard.

To make lye solution:

Place 2 level tablespoons of lye in 1 gallon of cold water. Stir with a wooden spoon or clean stick. Bring to a boil. Dip the fruit in the boiling solution (being careful to avoid spattering) for 5 to 30 seconds, depending on the toughness of the skins and the size of the fruit. The dipping should be long enough to form many small cracks in the skin when the fruit is washed. Rinse the prunes thoroughly in cold water to remove all traces of lye.

Dispose of the lye solution by carefully pouring it down the sink drain. Rinse the sink and utensils used with large amounts of cold water. Or, pour the lye solution carefully into the toilet bowl and flush several times.

be used). The sulfuring box should be large enough to permit a spacing of 1 to 1½ inches on all sides of the stack. A practical method of sealing at the bottom of the box is to push dirt against the bottom edges. Make an opening, 1 inch by 1½ inches at the bottom of the box to provide air for the burning sulfur. Make another hole, 1 inch square, at the upper edge of the opposite side to permit circulation of the sulfur fumes.

- The amount of sulfur used varies with the length of time the fruit is to be sulfured, weight of fruit, and the dimensions of the box. Only sulfur free of impurities will burn properly. Resublimed flowers of sulfur generally meets the standard of purity required. (See table for sulfuring times.) Use a clean metal container to hold the sulfur. For small amounts of fruit, a can about 3½ inches in diameter and 2 inches deep (similar to those in which crushed pineapple or shrimp are processed) will be large enough. A stack of eight trays that holds about 100 pounds of prepared fruit normally requires approximately 10 ounces of sulfur. The burning time of the sulfur will vary with the ventilation, shape of container, weather conditions, and other factors. We suggest that you check the level of the sulfur in the tin against the burning time to get the sulfuring times listed in the table.

- Place the can of sulfur under the box near the lower opening, and light the sulfur. Do not leave burned matches in the container.

- Immediately lower the box over the stack, and seal the bottom edges with dirt.

HOME DRYING OF FRUITS

Temperature 140 F, refers to fully ripe fruits

Fruit	Preparation	Predrying treatment		Test for dryness (cool before testing)
		Blanching	Sulfuring	
Apples	Peel and core, cut into slices or rings about 1/8 inch thick.	Steam only, about 5 minutes, depending on texture	45 minutes	Soft, pliable, no moist area in center when cut in half
Apricots	Pit and halve for steam blanch or sulfuring. For water blanch, leave whole and pit and halve after blanch.	Steam, 3 to 4 minutes Water, 4 to 5 minutes	2 hours	Same as apples
Figs	Preferable to partly dry on tree. Normally drop from tree when two-thirds dry. Leave whole.	None	None	Flesh pliable, slightly sticky but not wet
Grapes	Leave whole.	None	None	Raisinlike texture, no moist center
Nectarines and peaches	Remove skins if desired. When sulfuring, pit and halve.	Steam, 5 minutes if halved, 8 minutes if whole. Water, 8 minutes whole. Skin can be removed after blanch.	2-3 hours	Same as apples
Pears	Peeling preferred. Cut in half and core.	Steam only, 6 minutes	5 hours	Same as apples
Persimmons	Use firm fruit, as ripe is too difficult to handle. Using stainless steel knife, peel, slice.	None	None	Light to medium brown, tender but not sticky
Prunes	For sun-drying, dip in boiling lye solution* to check skins. For oven-drying, rinse in hot tapwater. Leave whole.	None	None	Leathery; pit should not slip when squeezed

* See page 6 for making lye solution.

AGRICULTURAL EXTENSION SERVICE
UNIVERSITY OF CALIFORNIA

325 Morgan Hall
Berkeley, California 94720

June 20, 1966

DEAR HOME ADVISORS:

In the recent bulletin, "Home Drying of Fruits" there are two points that need clarification.

The table on page 5 gives several methods for predrying. One may steam blanch or water blanch or sulphur. Use one of these methods before sun drying or oven drying. Work has been carried on at Davis by Mr. Miller and Mr. Winter on water blanching and they feel this makes a very nice product. Steam blanching means of course using a pan with holes in it over boiling water with the fruit in a single layer so the steam can penetrate the fruit. You can't do many fruits at one time but the time involved is much shorter than sulphuring. It might be easier for some homemakers to use this method rather than sulphuring.

The temperature of 140°F listed at the top of this table refers to oven drying and should have been omitted from this page and included under oven drying on page 8.

With three people reading this bulletin, it still escaped us all. I know most of these bulletins are distributed in answer to telephone or mail requests without an opportunity to talk to the individual. I'll leave it up to you if you want to mimeograph an insert slip to put in the bulletin or mark these changes in with ink. So sorry -- is all I can say!

Sincerely,

Christine Groppe

(Mrs.) Christine C. Groppe
Extension Nutritionist

CCG:ka

How much do you know about UCAES?

UCAES stands for University of California Agricultural Extension Service. Since 1914 this statewide organization has brought to California farmers and homemakers the latest scientific findings in agriculture and in family and consumer sciences, and has helped them put this information to everyday use.

Support for the Agricultural Extension Service is provided by state and federal governments and by county governments in 56 California counties that have local offices. The office, usually located in the county seat, is staffed by Agricultural Extension farm and home advisors. They are your personal links with the University's Division of Agricultural Sciences and the United States Department of Agriculture. They will be happy to give you advice in their fields of information.

CANNING AND FREEZING FISH AT HOME

UNIVERSITY OF CALIFORNIA AGRICULTURAL EXTENSION SERVICE
HXT – 3

The authors are Christine Groppe, Extension Nutritionist and Ruth Crawford, Home Advisor, Humboldt County.

The authors wish to acknowledge the assistance of Dr. Lionel Farber, Research Biochemist, Seafood and Nutrition Research Laboratory, George Williams Hooper Foundation, University of California Medical Center, San Francisco, California, on the canning of fish.

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SEPTEMBER 1967--10M, Rev.

BEWARE OF BOTULISM

If the directions as given in this booklet have not been followed in every detail, or if there is any doubt about the contents of the jar or can, **don't taste but boil** home-canned goods for at least 10 minutes. This caution applies to the use of all home-canned low-acid foods—vegetables (including those acid-canned), meats, poultry, and fish. Acid foods (fruits, tomatoes, rhubarb, and pickles) may become low-acid through the growth of mold.

A form of food poisoning called botulism is caused by the toxin produced when botulinum bacteria are present. They grow in the absence of air in foods that are low in acid or that have become low-acid. The toxin in one of the most poisonous substances known. However, it can be completely destroyed by boiling. **Never taste food that appears to be spoiled.** For further information see, Home Canning of Vegetables.

CANNING AND FREEZING FISH AT HOME

You may can or freeze your fish to enjoy the rewards of a fishing trip throughout the year. You can also purchase fresh fish in season to preserve for use later.

Fish is an important addition to the family meals; it is a good source of protein and many of the essential vitamins and minerals. Some fish is low in fat. It can be served in many different ways to provide variety in meals.

Fish should be canned or frozen as soon as possible after catching. Immediately after catching clean the fish and chill it either in ice or refrigerator until you are ready to preserve it. If chilling facilities are not immediately available rub the fish with a salt mixture, or cover with a wet sack or cloth.

TO CAN FISH

To use the pressure canner for canning see Agricultural Extension Service leaflet, Home Canning of Vegetables. Use a pressure canner that has a tested gauge. **Do not process for less than the prescribed time.**

Use pint jars or smaller. Wide-mouth jars are easiest to fill. Small enamel-lined ½-pound or 1-pound tin cans may be used.

Raw, Brine Pack

1. Scale salmon and other large-scaled fish by scraping from tail to head with a dull knife blade,or skin tuna.
2. Remove fins, clean fish thoroughly. Cut off head and tail. Wash the body cavities thoroughly.
3. Split fish lengthwise along the backbone. Remove the backbone, leaving as little flesh on the bone as possible.
4. Cut fish into pieces the length of the jar or can. Soak pieces 1 hour in a brine made of ½ pound (¾ cup) salt to 1 gallon of water. One gallon of brine will treat about 25 pounds of cleaned fish. Place a plate on the fish to keep it in the brine. Use the brine only once. Drain the brined fish for several minutes.
5. Fill the jars or cans flush with the rim (or follow alternate method at end of this section). Pack them as full as possible with the fish. Place the skin side of the fish next to the glass. Alternate head and tail ends if small fish are being packed. Do not add water.
6. Seal jars. If cans are used, exhaust in steam or in the oven because they are too shallow to set in the hot water. If in steam, leave the lids on. Seal after exhausting.
7. Process at 10 pounds pressure, 240 F for 1 hour and 50 minutes.

Alternate to step 5.

If so desired, fill the jars with the fish pieces, as in step 6. Add at least 1 teaspoon salt and fill with water.

To Freeze Crab

Separate legs and body as for canning. Clean and cook as described on pages 4 and 5. The crabmeat may be frozen either in the shell or as picked meat. The whole crab should be well wrapped in moisture-proof paper or the meat placed in a freezer container and packed tightly.

If crabmeat is to be stored for more than 4 months cover with a brine of 3 tablespoons salt to 1 gallon of water, being sure to leave space for expansion. Seal and freeze. The meat from the whole frozen crab will not be as white after storage as frozen crabmeat.

To Store Fish and Shellfish at 0 F.

Kinds	Number of Months
Fatty fish – mackerel, salmon, swordfish, etc.	3
Lean fish – haddock, cod, etc.	6
Shellfish	
Lobsters and crabs	2
Shrimp	6
Oysters	3 to 4
Scallops	3 to 4
Clams	3 to 4

To Thaw Fish

Partially thawed fish is easier to cook. Thaw a 1-pound package in refrigerator for 3 to 4 hours.

TO FREEZE FISH

Fish that is to be frozen must be kept cold, and cleaned and frozen quickly.

1. Clean, wash, and drain fish well. Pat dry.
2. Freeze small fish whole. Cut large fish into steaks, fillets, or boned strips for freezing.
3. Fatty fish, such as tuna and salmon, may be treated with an ascorbic acid dip (2 tablespoons ascorbic acid to 1 quart of water) for 20 seconds, or coat fish with a bland vegetable oil (like cottonseed or corn). This helps to prevent darkening and rancidity.
4. Use moisture-vapor proof paper to wrap fish.
5. Wrap in meal-size packages. Separate the pieces with two layers of freezing paper, polyethylene wrap, or foil.
6. Freeze quickly and store at 0 F or lower. The lower the temperatures the longer the storage life of the frozen fish.

To Freeze Smoked Fish

1. Smoked fish should be frozen as soon as it is removed from the smoking room.
2. Use moisture-vapor proof paper to wrap fish. Brush pieces with salad oil.
3. Wrap in meal-size packages. Separate the pieces with two layers of freezing paper, polyethylene wrap, or foil.
4. Freeze quickly and store at 0 F or lower.

Precooked Pack, Tuna Style

1. Rub all surfaces of cleaned fish, including the belly cavity, with a bland-flavored cooking oil.
2. Precook fish by steaming 2 to 4 hours, depending on the size, or cook in a moderate oven, 350 F, for about 1 hour. Cook until the blood along the backbone has set and is no longer pink.
3. Cool fish until it is firm enough to handle easily. Refrigerate to cool, or spray with cold water, either under the faucet or with a hose, and let cool overnight at room temperature.
4. Split the cooked fish lengthwise. Remove the backbone.
5. Skin fish; break into quarters lengthwise. Scrape away all dark meat.
6. Cut pieces into lengths ⅜ inch shorter than the height of the jar or can. Pack fish into containers; fill any spaces with broken pieces of fish.
7. Add ½ teaspoon salt to pint jars; ¼ teaspoon salt to half-pints.
8. Heat bland cooking oil (boiling water may be used). Be sure to keep the oil below the smoking temperature. Add 2 to 4 tablespoons of hot oil (or boiling water) to each pint, 1 or 2 tablespoons to half-pints.
9. Seal, if using jars. If cans are used, exhaust in steam or in the oven because they are too shallow to set in the hot water. If in steam, leave the lids on. Seal after exhausting.
10. Process at 10 pounds pressure, 240 F for 2 hours.

To Can Smoked Fish

Smoked fish should be canned immediately after smoking and cooling. Cut fish into pieces the length of the jars or cans. Pack carefully.

Proceed and process according to directions on page 2 for canning raw fish. Process 2 hours at 10 pounds pressure, 240 F.

TO CAN CRAB

Unless crabs are shelled before cooking, it is difficult to control discoloration.

To Shell:

1. Dip crabs in ice water for 1 or 2 minutes, then grasp the body between the back legs and break off the claws and legs.
2. To remove the back shell, insert fingers in the leg holes and pull the shell apart. Break the crabs in half for easier cleaning, cooking and handling.
3. Remove the gills or "finger," crab butter, and other viscera. Wash the bodies in a heavy spray of fresh water or in tubs if running water is not available. Use a stiff brush to scrub them. Change the water frequently and rinse the crabs thoroughly after washing.
4. Bring to a boil a large kettle of water to which ¼ cup distilled white vinegar or ¼ cup sodium citrate* has been added. Whole black peppers and bay leaves may be added, if desired.

5. Boil crabs 20 minutes, counting the time after the water comes back to a boil.
6. Pick meat out of shells as soon as possible after cooking. Break the claw and leg shells with a small mallet and peel off the broken pieces.

   Cut the body in two with a sharp knife and pound the shell against the pan in which the meat is to be picked. This loosens and releases the meat in large pieces. Keep the body meat separate from the leg and claw meat.
7. Make a brine of 1 cup white distilled vinegar (or 1 cup sodium citrate* or, ¼ cup citric acid) and 1 cup salt to each gallon of water. Immerse the picked meat in this brine for one minute. Save brine.
8. Press meat with the hands to remove excess moisture. Drain well.
9. Use half-pint jars, or ½-pound enamel-lined cans or smaller. Line the cans with vegetable parchment paper, if available.

   Place a layer of leg meat on the bottom and around the sides and fill the center with body meat. Or, place a layer of leg meat on the bottom, then a layer of body meat, with another layer of leg meat on top. Add 1 tablespoon brine from step 7 to each jar or can.
10. Seal jars. If cans are used, exhaust in steam or in the oven because they are too shallow to set in the hot water. If in steam, leave the lids on. Seal after exhausting.
11. Process at 10 pounds pressure, 240 F for 65 minutes.

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*Sodium citrate keeps canned crab more tender and a better color than vinegar does.

How much do you know about U C A E S ?

UCAES stands for University of California Agricultural Extension Service. Since 1914 this statewide organization has brought to California farmers and homemakers the latest scientific findings in agriculture and in family and consumer sciences, and has helped them put this information to everyday use.

Support for the Agricultural Extension Service is provided by state and federal governments and by county governments in 56 California counties that have local offices. The office, usually located in the county seat, is staffed by Agricultural Extension farm and home advisors. They are your personal links with the University's Division of Agricultural Sciences and the United State Department of Agriculture. They will be happy to give you advice in their fields of information.

BRINING PICKLES AT HOME

UNIVERSITY OF CALIFORNIA AGRICULTURAL EXTENSION SERVICE
Pub. HXT–67

Compiled by Marion T. Tate, Home Advisor at Large, with the assistance of George K. York, Jr., Assistant Professor, Department of Food Science and Technology, Davis.

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AUGUST 1964--5M

If you think anyone has eaten spoiled food, call a doctor at once. Call your health department. If you think the food is spoiled more than from mold, save the food in the jar, if possible. Handle the jar with gloves, or with a cloth. Boil the gloves or cloth. Do not put the jar where any person or animal can touch it.

Be careful how you throw the food away. But throw away any jar of canned food that doesn't look or smell right. It's cheaper than being sick. Do not put the jar of food where any person or animal might eat it.

If you have a flush toilet, empty the jar of food in it, and flush the toilet several times. Do not put your hands to your face. Boil the jar and lid in boiling water with 3 to 4 tablespoons of strong soap powder. Boil at least 30 minutes.

If you do not have a flush toilet, empty the spoiled food into an old pail or pan. Put the jar and lid into the pan. Cover the jar and food with water. Add 3 to 4 tablespoons of strong soap powder. Boil at least 30 minutes.

Do not use the jar or lid again. Throw them away after they have been boiled.

Clean your hands, and everything that has touched the jar of food, with laundry bleach. Use 4 parts water to 1 part bleach. Then wash your hands and all utensils very carefully with soap and water.

Sweet Pickles

For each gallon of freshened brined vegetables:

- 3 cups cider vinegar
- 1 cup water
- 1 cup sugar for first syrup
- 1 tablespoon mixed pickling spices
- 1 to 2 cups sugar for second syrup (brown sugar often is preferred)

1. Prick each vegetable in several places with a large needle, or stainless steel or silver fork. If not pricked, the sweet vinegar may cause the pickles to shrivel.
2. Combine vinegar, water, 1 cup sugar, and spices. Bring to a boil and boil for 3 minutes. Pour over vegetables. Let stand 3 days.
3. Remove vegetables from syrup and pack into clean, hot jars.
4. Remove spices from syrup. Add 1 to 2 cups sugar and bring syrup to a boil.
5. Pour hot syrup over pickles. Seal at once.

BE SAFE

Because there can be mistakes in home canning, look at each jar of home-canned food very carefully before using it. Be sure the seal is tight.

If you think the jar doesn't look right, if there is mold or any sign of spoiling, don't taste the food. If you do not save it for a health officer, get rid of the jar of food.

BRINING PICKLES AT HOME

Pickles are made by two general methods: 1) slow brining and curing, or 2) quick processing. The directions in this leaflet are for slow brining (long process).

Each step of the process in making brined or fermented pickles is important.

- The salt content of the brine must be just right — high enough to inhibit growth of spoilage organisms but not high enough to prevent action of the lactic acid bacteria that cause fermentation.
- A temperature between 70° and 80° F is recommended for best results.
- Pickles must be covered completely with brine at all times. Even one pickle above the brine can cause spoilage of the entire lot.
- If scum forms, remove it at once. It is caused by growth of spoilage organisms.
- Air must be excluded after fermentation stops. Lactic acid bacteria grow without air, and the acid they produce, combined with salt, preserves the pickles. If air is present, spoilage bacteria can grow.

INGREDIENTS

Salt. Pure granulated salt (sack salt) is best for pickling. Table salt can be used, but it usually has some chemical added to prevent caking. This may cause cloudiness and darkening of the pickles.

Vinegar. Use a good, clear, standard vinegar, free from sediment, with 4 to 6 per cent acetic acid (most vinegars sold in California are 5 per cent). This is termed 40- to 60-grain strength. Vinegar that is too strong is sour and causes shriveling. Distilled white vinegar keeps the original color in foods. Cider vinegar may slightly darken the food, but may be preferred for its flavor and aroma. Poor quality vinegar may contain copper or iron which discolors pickles and gives off-flavors.

Spices. Use fresh whole spices unless the recipe calls for ground spices.

Sugar. Use a granulated cane or beet sugar. Brown sugar is sometimes used for its darker color and stronger flavor.

Hardening Agents. Do not use alum. It is not necessary when you use good methods of processing. It is difficult to measure the small amount used in home preparation of pickles, and too much alum may soften the pickles.

Vegetables. Choose firm, fresh vegetables, free from bruises or blemishes.

and let stand 10 to 12 hours or until most of the salt is removed.

3. Drain and sort vegetables for size.

The vegetables are now ready to "pickle."

Sour Pickles

1. Pack freshened vegetables into hot jars.
2. Cover with hot, full-strength cider vinegar. Seal at once.

Spiced Sour Pickles

For each quart cider vinegar use 2 tablespoons mixed pickling spices.

1. Simmer vinegar and spices together for 5 minutes. Remove from heat and let stand 10 to 12 hours (or overnight).
2. Strain out spices.
3. Pack freshened vegetables into jars. Cloves and pieces of stick cinnamon may be added to the jars if more spicing is desired.
4. Bring spiced vinegar to a boil. Pour hot over pickles. Seal at once.

Wash the weight and the cover. Rewrap the cover with clean cloth. Replace cover and weight.

Add ¼ pound salt (6 tablespoons) to the liquid above the cover.

7. At the end of the second, third, fourth, fifth, and sixth weeks, add ¼ pound salt (6 tablespoons) to the liquid above the cover.

   Always remove scum as it forms.

   Vegetables always should be completely covered with brine.

The pickles will be ready to use in from 6 to 8 weeks. Cucumbers should be dark olive green throughout and have no white spots.

To Freshen Pickles

Remove excess salt before you make sour or sweet pickles from the brined vegetables.

1. Remove vegetables from brine. Place them in a large amount of water and heat to the simmering point. Keep at a simmer about 20 minutes. Do not boil.

2. Drain vegetables. Cover with fresh water and heat to simmering. Remove from heat and let stand 12 to 16 hours. If still too salty, drain, cover with cold water

Pickling cucumbers are smaller, lighter in color, and have more spines than the usual eating cucumber. For pickling, choose small, underripe cucumbers that are fresh and firm. Several varieties which make good pickles include National Pickling, Early Forbes, Robinson SMR-58, Napa 63, and Wisconsin SMR-15.

Water. Usually it makes little difference whether soft or hard water is used. Water containing an appreciable amount of iron may cause the pickles to darken.

EQUIPMENT

Use glass-top jars with a rubber ring. You may use the two-piece metal lids with sealing compound in a groove of the lid, but these lids eventually will corrode and become pitted, and perhaps darken the surface of the pickles. This does not occur with glass-top jars.

Do not use zinc screw caps with porcelain lining for pickles, because poisonous zinc salts are formed by their reaction with vinegar and other acids in the brine.

Stoneware open jars also may be used for home pickling, but they are not as convenient as glass jars. If you use open jars, cover the pickles with a plate or a piece of wood cut to fit. Place a weight on the plate or wooden disk to keep the vegetables submerged in the brine.

Watertight kegs or barrels are best for making large quantities of pickles. We recommend new hardwood barrels or paraffin-lined spruce barrels with a 6-inch opening in the head. Spruce barrels are best when silicated and double-paraffined.

If you use old barrels, first treat them to remove undesirable odors and flavors. Use 1 ounce of sal soda or ½ ounce of lye per gallon of water. Fill the barrel and let it stand for several days until it smells "sweet." Then fill it with hot or cold water and let stand for a few hours, and rinse at least three times to remove the soda or lye. Of course, hot water cannot be used in paraffined barrels. If you use spruce or pine barrels, line them with paraffin to prevent off-flavors in the pickles.

FERMENTED PICKLES

In fermented pickles, lactic acid bacteria produce lactic acid from the sugars in the vegetables. It is important to maintain conditions which help the growth of the lactic acid bacteria and prevent growth of other organisms which may cause spoilage. For success in making fermented pickles:

- Keep air from vegetables during all stages of processing—before, during, and after fermentation. Keeping air out will prevent growth of spoilage organisms that need air to grow.
- Keep the temperature of the vegetables and brine as near 70° to 80° F as possible.
- Keep the correct salt concentration in the brine. When added to the vegetables, the salt content of the brine should be about 8 per cent salt, or about ¾ pound salt per gallon of water. This salt content is high enough to inhibit growth of spoilage organisms, but one at which lactic acid bacteria grow well.

VINEGAR PICKLES

Sour or sweet pickles can be made from vegetables that are cured in brine.

Brining Vegetables

Use small cucumbers, burr gherkins, snap beans, green tomatoes, chayotes, cauliflower, onions, or peppers.

1. Pack vegetables in a jar, stoneware crock, keg, or barrel.
2. Cover with brine. Use 1 pound salt per gallon of water for all vegetables except onions, cauliflower, and peppers. For these use 1½ pounds salt per gallon of water.
3. Add bay leaves if desired.
4. Have a plate, or board wrapped in cheesecloth, which fits snugly inside the container. Weight this cover with a clean stone (not limestone), paraffined brick, or glass jar filled with water.
5. The next day add 1 pound salt to the liquid above the weighted cover. Salt added to the brine below the cover may sink, and the salt solution will be very strong at the bottom and may be so weak at the surface that the pickles will spoil.
6. After 1 week remove the weight and the cover. Skim the brine with a spoon if any scum has formed. Wipe around the rim of the jar at the surface of the liquid with a damp clean cloth.

2. Make a brine of ½ pint vinegar and ¾ pound salt (1⅛ cups, or 1 cup plus 2 tablespoons) per gallon of water.

3. Follow steps 3 through 6 for fermented dill pickles (pages 6 and 7), omitting spices.

To prepare these fermented vegetables for the table, parboil them in water 3 to 4 minutes to remove excess salt. Drain. Cook until tender in fresh water.

BRINING WITHOUT FERMENTATION

Whole cucumbers, onions, and peppers, snap beans, and corn on the cob may be preserved in strong brine.

1. Make a brine of 3 pounds salt (4½ cups) and 1 pint vinegar for each gallon water.

2. Weigh the prepared vegetables.

3. Put the weighed vegetables in a stoneware jar or glass canning jars.

Add at least 1 pint of brine for each pound of vegetables.

If glass jars are used, be sure vegetables are covered with brine. Seal jars tightly.

If open jars are used, keep the vegetables under the brine with a weighted wooden cover or plate. The vegetables will float at first in the brine. Seal with paraffin.

Discard any pickles that become soft, slimy, or develop disagreeable odors—they are not safe to eat.

- Add a small amount of vinegar to the brine for dill pickles. Most undesirable bacteria cannot grow well in slightly acid conditions; the lactic acid bacteria grow well in fairly strong acid.

- Remove any "pickle scum" as it forms or the pickles will spoil. This scum forms if the container cannot be sealed and air is present. Scum is the growth of spoilage organisms; if it is allowed to continue it will destroy the acid and provide conditions for the growth of additional spoilage organisms.

Fermented Dill Pickles*

1. Use cucumbers of medium size, as freshly picked as possible. Have mixed dill spices and dill herb ready. About 1 quart of mixed dill spice is used for a 50-gallon barrel of pickles, or about 3 fluid ounces for a 5-gallon barrel. The spice mixture consists of approximately equal weights of whole cloves, coriander, and black pepper, with about 1 ounce of dry bay leaves for each 15 ounces of the mixed whole spices. A total of 6 to 8 pounds of green or salted dill herb or 3 to 4 pounds of the dry plant is used for each 50 gallons of pickles; or about ¾ pound of the green or salted or 6 ounces of the dry plant to a 5-gallon barrel.

2. Wash the cucumbers and drain off surplus water.

* Green tomatoes also can be fermented following these directions, or those on page 7.

3. Pack the cucumbers in a canning jar or wooden keg. If a keg is used, loosen the hoops at one end and remove the head, unless the keg or barrel has a large opening. Place a layer of dill herb in the bottom of the jar or keg, then fill with cucumbers, occasionally adding more dill herb and mixed spices.

4. Add a brine made of ½ pint vinegar and ¾ pound salt (1⅛ cups, or 1 cup plus 2 tablespoons) per gallon of water. In open containers, the brine must cover the vegetables completely. If a glass-top jar is used, fill with brine and leave the bail of the lid in the half-closed position so that gas formed during fermentation can escape. If jars with other type lids are used, do not seal them. If the head of a keg was removed to permit filling, replace it and tighten the hoops. Then fill with brine through the bung hole and drive the bung in tightly. Bore a gimlet hole in the head to allow gas to escape during fermentation. Close this hole with a wooden peg after fermentation stops.

5. Place the fermentation containers (jars, barrels, or kegs) in a cool place, preferably between 70° and 80° F. Lower temperatures, 50° to 70° F, can be used, but fermentation takes longer.

   Dill pickles cure slowly; usually it is 2 or 3 months before they acquire the desired color, texture, and flavor. The temperature at which they are stored influences the pickling time. Keep the jars or kegs filled with brine at all times. At frequent intervals, replace the brine lost during fermentation and storage.

   If stoneware jars or other open containers are used, see that the false head is covered at all times with at least 2 inches of brine. Remove all scum as rapidly as it forms in such containers. Seal with paraffin when gas formation stops. It is difficult to make good dill pickles in open jars. A sealed keg, barrel or glass-top jar is recommended.

6. If the pickles are made in open jars, it is best to pack them in glass jars when the fermentation is nearly complete. If jars are not available, cover the surface of the liquid with paraffin to prevent spoiling by scum and mold. If, at any time, the pickles become soft and slimy and develop a disagreeable odor, discard them.

Other Fermented Vegetable Pickles

Peppers, green tomatoes*, cauliflower, brussels sprouts, and artichokes may be made into fermented pickles. Spices usually are not used. Other vegetables, particularly asparagus, snap beans, corn, peas, and spinach should not be prepared in this way; there is danger of botulinum poisoning (botulism).

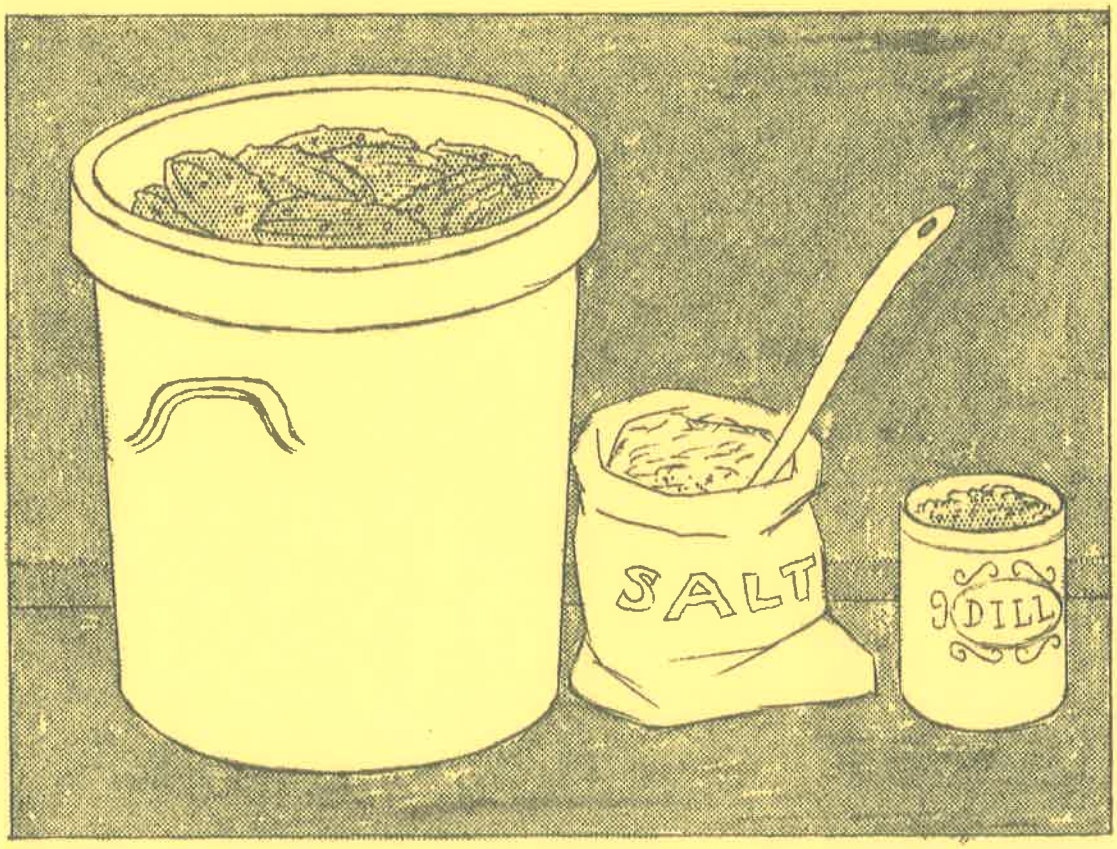
1. Prepare peppers, green tomatoes, and brussels sprouts by washing thoroughly and draining.

   Cut cauliflower from the head, wash, and drain.

   Trim artichokes to the edible "heart," discarding the outer leaves or bracts.

* Green tomatoes also may be fermented following directions for dill pickles on page 5.

BRINED PICKLES



UNIVERSITY OF CALIFORNIA AGRICULTURAL EXTENSION SERVICE

BRINED PICKLES

UNIVERSITY OF CALIFORNIA AGRICULTURAL EXTENSION SERVICE

HOME PREPARATION OF PICKLES BY BRINING (LONG-PROCESS PICKLES)

Pickles are made by two general methods: 1) slow brining and curing, or 2) quick processing. The directions in this leaflet are for the slow brining (long process).

Each step of the process in making brined or fermented pickles is important.

- The salt content of the brine must be just right--high enough to inhibit growth of spoilage organisms but not high enough to inhibit action of the lactic acid bacteria that cause fermentation.
- A temperature between 70° and 80°F is recommended for best results.
- Pickles must be covered completely with brine at all times. Even one pickle above the brine can cause spoilage of the entire lot.
- If scum forms, remove it at once. It is caused by growth of spoilage organisms.
- Air must be excluded after fermentation stops. Lactic acid bacteria grow without air, and the acid they produce, combined with salt, preserves the pickles. If air is present, spoilage bacteria can grow.

Ingredients

Salt

Pure granulated salt (sack salt) is best for pickling. Table salt can be used, but it usually has some chemical added to prevent caking. This may cause cloudiness and darkening of the pickles.

Vinegar

Use a good, clear, standard vinegar, free from sediment, with 4 to 6 percent acetic acid (most vinegars sold in California are 5 percent). This is termed 40- to 60-grain strength. Vinegar that is too strong is sour and causes shriveling. Distilled white vinegar keeps the original color in foods. Cider vinegar may slightly darken the food, but may be preferred for its flavor and aroma. Poor quality vinegar may contain copper or iron which discolors pickles and gives off flavors.

Spices

Use fresh whole spices unless the recipe calls for ground spices.

Sugar

Use a granulated cane or beet sugar. Brown sugar is sometimes used for its darker color and stronger flavor.

Hardening Agents

Do not use alum. It is not necessary when you use good methods of processing. It is difficult to measure the small amount used in home preparation of pickles, and too much alum may soften the pickles.

Vegetables

Choose vegetables that are firm, fresh, and free from bruises or blemishes.

Pickling cucumbers are smaller, lighter in color, and have more spines than the usual eating cucumber. For pickling, choose small, underripe cucumbers that are fresh and firm. Several varieties which make good pickles include National Pickling, Early Forbes, Robinson SMR-58, Napa 63, and Wisconsin SMR-15.

Water

Usually it makes little difference whether soft or hard water is used. Water containing an appreciable amount of iron may cause the pickles to darken.

Equipment

Use glass-top jars with a rubber ring if you can get them. Or you can use the more readily available two-piece metal lids with sealing compound in a groove of the lid. These lids eventually will corrode and become pitted, and perhaps darken the surface of the pickles. This does not occur with glass-top jars.

Do not use zinc screw caps with porcelain lining for pickles, because poisonous zinc salts are formed by their reaction with vinegar and other acids in the brine.

Stoneware open jars also may be used for home pickling, but they are not as convenient to use as glass jars. If you use open jars, cover the pickles with a plate or a piece of wood cut to fit. Place a weight on the plate or wooden disk to keep the vegetables submerged in the brine.

Watertight kegs or barrels are best for making large quantities of pickles. We recommend new hardwood barrels or paraffin-lined spruce barrels with a 6-inch opening in the head. Spruce barrels are best when silicated and double-paraffined.

If you use old barrels, first treat them to remove undesirable odors and flavors. Use 1 ounce of sal soda or 1/2 ounce of lye per gallon of water. Fill the barrel and let it stand for several days until it smells "sweet". Then fill it with hot or cold water and let stand for a few hours, and rinse at least three times to remove the soda or lye. Of course, hot water cannot be used in paraffined barrels. If you use spruce or pine barrels, line them with paraffin to prevent off flavors in the pickles.

Fermented Pickles

In fermented pickles, lactic acid bacteria produce lactic acid from the sugars in the vegetables. It is important to maintain conditions which help the growth of the lactic acid bacteria and prevent growth of other organisms which may cause spoilage. For success in making fermented pickles:

- Keep air from vegetables during all stages of processing; before, during, and after fermentation. Keeping air out will prevent growth of spoilage organisms that need air to grow.

- Keep the temperature of the vegetables and brine as near 70° to 80°F as possible.

- Keep the correct salt concentration in the brine. When added to the vegetables, the salt content of the brine should be about 8 percent salt, or about 3/4 pound salt per gallon of water. This salt content is high enough to inhibit growth of spoilage organisms, but one at which lactic acid bacteria grow well.

- Add a small amount of vinegar to the brine for dill pickles. Most undesirable bacteria cannot grow well in slightly acid conditions; the lactic acid bacteria grow well in fairly strong acid.

- Remove any "pickle scum" as it forms or the pickles will spoil. This scum forms if the container cannot be sealed and air is present. Scum is the growth of spoilage organisms and if it is allowed to continue will destroy the acid and provide conditions for the growth of additional spoilage organisms.

Directions For Fermented Dill Pickles*

1. Use cucumbers of medium size, as freshly picked as possible. Have mixed dill spices and dill herb ready. About 1 quart of mixed dill spice is used for a 50-gallon barrel of pickles, or about 3 fluid ounces for a 5-gallon barrel. The spice mixture consists of approximately equal weights of whole cloves, coriander, and black pepper with about 1 ounce of dry bay leaves for each 15 ounces of the mixed whole spices. A total of 6 to 8 pounds of green or salted dill herb or 3 to 4 pounds of the dry plant is used for each 50 gallons of pickles; or about 3/4 pound of the green or salted, or about 6 ounces of the dry plant to a 5-gallon barrel.

2. Wash the cucumbers and drain off surplus water.

3. Pack the cucumbers in a canning jar or wooden keg. If a keg is used, loosen the hoops at one end and remove the head, unless the keg or barrel has a large opening. Place a layer of dill herb in the bottom of the jar or keg, then fill with cucumbers, occasionally adding more dill herb and mixed spices.

4. Add a brine made of 1/2 pint vinegar and 3/4 pound salt (1 and 1/8 cups, or 1 cup plus 2 tablespoons) per gallon of water. In open containers, the brine must cover the vegetables completely. If a glass-top jar is used, fill with brine and leave the bail of the lid in the half-closed position so that gas formed during fermentation can escape. If jars with other type lids are used, do not seal them. If the head of a keg was removed to permit filling, replace it and tighten the hoops. Then fill with brine through the bung hole and drive the bung in tightly. Bore a gimlet hole in the head to allow gas to escape during fermentation. Close this hole with a wooden peg after fermentation stops.

5. Place the fermentation containers (jars, barrels, or kegs) in a cool place, preferably between 70° and 80°F. Lower temperatures, 50° to 70°F, can be used, but fermentation takes longer.

   Dill pickles cure slowly; usually it is 2 or 3 months before they acquire the desired color, texture, and flavor. The temperature at which they are stored influences the pickling time. Keep the jars or kegs

*Green tomatoes also can be fermented following these directions, or those on page 5.

filled with brine at all times. Replace the brine lost during fermentation and storage at frequent intervals. If stoneware jars or other open containers are used, see that the false head is covered at all times with at least 2 inches of brine. Remove all scum as rapidly as it forms in such containers. Seal with paraffin when gas formation stops. It is difficult to make good dill pickles in open jars; a sealed keg, barrel, or glass-top jar is recommended.

6. If the pickles are made in open jars, it is best to pack them in glass jars when the fermentation is nearly complete. If jars are not available, cover the surface of the liquid with paraffin to prevent spoiling by scum and mold. If, at any time, the pickles become soft and slimy and develop a disagreeable odor, discard them.

Directions For Other Fermented Vegetable Pickles

Peppers, green tomatoes*, cauliflower, Brussels sprouts, and artichokes may be made into fermented pickles. Spices usually are not used. Other vegetables, particularly asparagus, snap beans, corn, peas, and spinach should not be prepared in this way; there is danger of botulinum poisoning (botulism).

1. Prepare peppers, green tomatoes, and Brussels sprouts by washing thoroughly and draining.

   Cut cauliflower from the head, wash and drain.

   Trim artichokes to the edible "heart," discarding the outer leaves or bracts.

2. Make a brine of 1/2 pint vinegar and 3/4 pound salt (1 and 1/8 cups, or 1 cup plus 2 tablespoons) per gallon of water.

3. Follow steps 3 through 6 for fermented dill pickles (p. 4), omitting spices.

To prepare these fermented vegetables for the table, parboil them in water 3 to 4 minutes to remove excess salt. Drain. Cook until tender in fresh water.

*Green tomatoes also may be fermented following directions for dill pickles on page 4.

Preserving Vegetables in Strong Brine Without Fermentation

Whole cucumbers, onions, and peppers, snap beans, and corn on the cob may be preserved in strong brine.

1. Make a brine of 3 pounds salt (4-1/2 cups) and 1 pint vinegar for each gallon of water.

2. Weigh the prepared vegetables.

3. Put the weighed vegetables in a stoneware jar or glass canning jars.

   Add at least 1 pint of brine for each pound of vegetables.

   If glass jars are used, be sure vegetables are covered with brine. Seal jars tightly.

   If open jars are used, keep the vegetables under the brine with a wooden cover or plate and a weight. The vegetables will float at first in the brine. Seal with paraffin.

Any pickles that become soft, shiny, or develop disagreeable odors are not safe to eat and should be discarded.

Vegetable Pickles in Vinegar

Sour or sweet pickles can be made from vegetables which are cured in brine.

Brining Vegetables

Use small cucumbers, burr gherkins, snap beans, green tomatoes, chayotes, cauliflower, onions, or peppers.

1. Pack vegetables in a jar, stoneware crock, keg, or barrel.

2. Cover with brine. Use 1 pound salt per gallon of water for all vegetables except onions, cauliflower, and peppers. For these use 1-1/2 pounds salt per gallon of water.

3. Add bay leaves if desired.

4. Have a plate, or board wrapped in cheesecloth which fits snugly inside the container. Weight this cover with a clean stone (not limestone), paraffined brick or glass jar filled with water.

5. The next day add 1 pound salt in the liquid above the weighted cover. Salt added to the brine below the cover may sink, and the salt solution will be very strong at the bottom and may be so weak at the surface that the pickles will spoil.

6. After 1 weekremove the weight and cover. Skim the brine with a spoon if any scum has formed. Wipe around the rim of the jar at the surface of the liquid with a damp clean cloth. Wash the weight and cover. Rewrap the cover with clean cloth. Replace cover and weight. Add 1/4 pound salt (6 tablespoons) to the liquid above the cover.

7. At the end of the second, third, fourth, fifth, and sixth weeks, add 1/4 pound salt (6 tablespoons) to the liquid above the cover.

Always remove scum as it forms.

Vegetables always should be completely covered with brine.

The pickles will be ready to use in from 6 to 8 weeks. Cucumbers should be dark olive green throughout and have no white spots.

To Freshen Pickles

Remove excess salt before you make sour or sweet pickles from the brined vegetables.

1. Remove vegetables from brine. Place them in a large amount of water and heat to the simmering point. Keep at a simmer about 20 minutes. Do not boil.

2. Drain vegetables. Cover with fresh water and heat to simmering. Remove from heat and let stand 12 to 16 hours. If still too salty, drain, cover with cold water and let stand 10 to 12 hours, or until most of the salt is removed.

3. Drain and sort vegetables for size.

The vegetables are now ready to "pickle."

Sour Pickles

1. Pack freshened vegetables into hot jars.

2. Cover with hot, full-strength cider vinegar. Seal at once.

Spiced Sour Pickles

For each quart cider vinegar use 2 tablespoons mixed pickling spices.

1. Simmer vinegar and spices together for 5 minutes. Remove from heat and let stand 10 to 12 hours (or overnight).

2. Strain out spices.

3. Pack freshened vegetables into jars. Cloves and pieces of stick cinnamon may be added to the jars if more spicing is desired.

4. Bring spiced vinegar to a boil. Pour hot over pickles. Seal at once.

Sweet Pickles

For each gallon of freshened brined vegetables:

3 cups cider vinegar
1 cup water
1 cup sugar for first syrup
1 tablespoon mixed pickling spices
1 to 2 cups sugar for second syrup (brown sugar often is preferred)

1. Prick each vegetable in several places with a large needle, stainless steel or silver fork. If not pricked, the sweet vinegar may cause the pickles to shrivel.

2. Combine vinegar, water, 1 cup sugar and spices. Bring to a boil and boil for 3 minutes. Pour over vegetables. Let stand 3 days.

3. Remove vegetables from syrup and pack into clean, hot jars.

4. Remove spices from syrup. Add 1 to 2 cups sugar and bring syrup to a boil.

5. Pour hot syrup over pickles. Seal at once.

April 1964

Compiled by Marion T. Tate, Home Advisor at Large, with the assistance of George K. York, Jr., Assistant Professor, Department of Food Science and Technology, Davis.

CO-OPERATIVE EXTENSION WORK IN AGRICULTURE AND HOME ECONOMICS
U. S. Department of Agriculture and University of California co-operating

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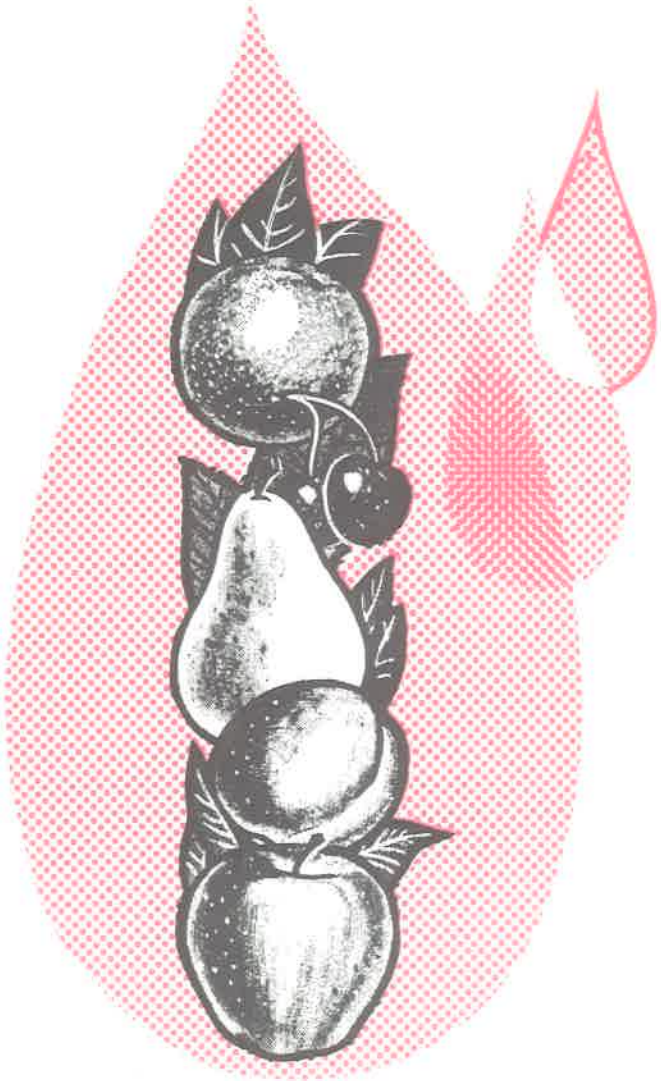
6/61--7500

. BOTTLING
. CANNING
. FREEZING

FRUIT JUICES
and TOMATO JUICE



UNIVERSITY OF CALIFORNIA AGRICULTURAL EXTENSION SERVICE
HXT-8

CONTENTS

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Revised from Home Bottling and Canning of Fruit Juices, by Hilda Faust and Maynard A. Joslyn.

Plums	Use firm, rich-flavored, well-colored plums. Wash, crush, and add 1 quart water to each 2 pounds of plums.	Heat at about 180° F. until soft.	Drain and squeeze through a cloth or bag; strain.	Add sugar to taste—about 1 cup sugar to 4 cups of juice.
Rhubarb	Wash stalks; cut into 4-inch lengths. Add 2 quarts water for each 10 pounds rhubarb.	Heat until water begins to boil.	Drain and squeeze through a cloth or bag; strain.	Add 1 cup sugar to 2 quarts (8 cups) juice.
Tomatoes	Use well-ripened tomatoes, deep in color. See directions on page 9.		Put through a fine colander; add salt to taste.	None

* The temperatures given for heating the fruit before extracting the juice are below the simmering temperature. Apricots, nectarines, and peaches may be boiled before straining.

DIRECTIONS FOR EXTRACTING FRUIT JUICE (cont.)

Fruit	Preparing Fruit	Heating Before Extracting*	Extracting Juice	Sugar
Grapes, red	Wash; remove large stems. Fill cheesecloth bag with quart of grapes. Immerse in gallon of rapidly boiling water for 30 seconds. Crush fruit or put through coarse food chopper. Let stand 10 minutes, stirring occasionally.	Do not reheat.	Drain and squeeze through a cloth or bag; strain.	None
Grapes, purple	Wash; remove large stems; crush fruit or put through coarse food chopper. Avoid crushing seeds.	Heat to 160° F.	Drain and squeeze through a cloth or bag; strain.	None
Grapes, white	Wash; remove large stems; crush fruit or put through coarse food chopper. Avoid crushing seeds.	Do not heat.	Drain and squeeze through a cloth or bag; strain.	None
Pears	Preserving not recommended.			

Preserving Juice

Fruit juices preserved at home will keep their fresh flavor and attractive color if they are not heated excessively. Boiling, or heating below the boiling point for long periods, usually gives juices an unpleasant cooked flavor. Apricot and tomato juices are exceptions; they can withstand more heat and still not develop cooked flavors.

To keep the flavor, color, and nutritive value of fresh fruits, this booklet recommends bottling, canning, and freezing most juices by methods using temperatures below the boiling point. However, tomato juice, which is less acid than most fruit juices, should be processed at the temperature of boiling water, 212° F.

The steps in extracting and heating fruit juices are the same for juices to be bottled, canned, or frozen. Frozen juices retain their flavor best when they are heated for only a short time at moderate temperatures, and then chilled quickly.

Equipment

Use equipment made of stainless steel, glass, aluminum, plastic, or unchipped enamel. Heating is fastest in aluminum ware, but acid fruit juices will pit the metal. If you use electric stoves or heating units, make allowance for retained heat.

Straw-berries	Wash, hull and crush.	Heat to 175° F.	Drain and squeeze through a cloth or bag; strain.	1 cup sugar to 3 cups juice. If blended with other berry juice, 1 cup sugar to 9 cups juice.
Cherries, sweet red (sour cherries may be used)	Wash, stem, pit, and crush or put through food chopper.	Heat to 160° F.	Drain and squeeze through a cloth or bag; strain.	Not necessary; if desired, use 1 cup sugar to 9 cups juice.
Cherries, white	Wash, stem, pit, and crush or put through food chopper.	Do not heat.	Drain and squeeze through a cloth or bag; strain.	Not necessary; if desired, use 1 cup sugar to 9 cups juice.
Citrus fruits Oranges Lemons Grape-fruit	Have fruit at room temperature. Navel oranges are not recommended for canning juice; if used, cut out navel end before reaming.	Do not heat.	Use any type reamer except press **type; avoid** pressing oil or juice from peel; do not remove all of pulp; put juice through colander.	None

Never use galvanized equipment. The acid from the fruit dissolves the zinc coating, which is poisonous.

JARS OR BOTTLES

- Use washed and sterilized (recently boiled) jars or bottles. Keep in hot water, just below the boiling point, until used.
- Scald or boil jar lids according to the manufacturer's directions. If no directions are given, scald the lids in boiling water just before they are used.
- Use bottles that can be sealed with crown-type bottle caps. Use clean dry caps as purchased. Do not wash or scald. Metal foil or plastic spotted cork-lined crown, caps are preferred to plain cork-lined crown caps. The latter may carry heat-resistant mold spores. Plastic-lined crown caps without inner cork lining are now available. Use only new, clean crown caps and be sure that the sealer is adjusted for a tight seal.

FREEZER CONTAINERS

Use rigid containers made of plastic, or glass canning or freezing jars, with lids which seal tightly. Tempered glass containers, which will withstand freezing temperatures, should be used. To prevent containers from bursting, allow a ten per cent head space for the expansion of liquids during freezing. This varies from 1½ inches of head space in containers with narrow top openings to ½ inch in pint containers with wide mouths.

DIRECTIONS FOR EXTRACTING FRUIT JUICE

Fruit	Preparing Fruit	Heating Before Extracting*	Extracting Juice	Sugar
Apples	Wash. Use fruit juice extractor or hand press or put through food grinder, using coarsest knife.	Do not heat.	Squeeze through a strong clean cloth bag; strain.	None
Apricots Nectarines Peaches	Use only firm fruit, ripe but not soft. Wash; remove any stems.	Drop fruit in boiling water, ½ to 1 inch deep; boil until soft.	Put through a colander to separate skins and pits from pulp; strain.	Mix equal parts of pulp with a thin syrup (1 cup sugar to 4 cups water) or blend with equal part of orange or grapefruit juice.
Berries Blackberry Boysenberry Loganberry Raspberry (red or black) Youngberry	Wash and crush well-ripened berries.	Heat to 175° F.	Drain and squeeze through a cloth or bag; strain.	Not necessary; if desired, use 1 cup sugar to 9 cups juice.

Preparing Juice

Heating makes juice extraction easier and deepens the color of the juice. It also inactivates enzymes, so that the juice retains better quality. These fruits normally are heated before juicing:

apricots
berries
cherries, red
grapes, red
peaches
plums
rhubarb
tomatoes

These fruits are not heated before juicing:

apples
cherries, white
grapefruit
grapes, white
lemons
oranges

Extract juices as rapidly as possible, with minimum exposure to air. After extracting and straining the juices, heat them quickly to sterilization temperatures for bottling, canning, or freezing (see directions under "Heating or Pasteurizing Juices," page 5).

If it is not convenient to complete the juice-making process at one time, berries, red cherries, and red grapes may be crushed and frozen for later juice making. When these fruits are frozen, it is not necessary to heat them before extracting the juice. Prepare the fruit as directed, but, instead of heating it, place the crushed fruit in large-volume, straight-sided freezer containers. Seal and freeze. When you are ready to complete the juice making, thaw the fruit in the closed containers and extract the juice as directed in the table on page 14. Heat, and bottle or freeze as directed.

If light-colored fruits are stored in the freezer for later juice making, they will discolor and the discoloration will increase during thawing. Heat treatment, such as blanching, or the addition of ascorbic acid, as described in the circular on home freezing* will prevent both discoloration and changes in flavor.

Tomatoes change in texture and lose vitamin C during freezer storage and thawing. Tomato juice made from frozen tomatoes is thin in body and has lost most of its vitamin C.

EXTRACTING JUICE

To extract juice:

- Use only sound, ripe fruit. Surface blemishes do not affect the juice.
- Sort and wash fruits carefully.
- Crush or grind most fruits to obtain a high juice yield when they are pressed. (Directions for extracting juice from various fruits are given in the table on page 14.)
- Use cloth bags for pressing juice from soft fruits. Clean muslin or canvas bags which are finely woven yield clear juices if you apply only slight pressure as you extract the juice.

STRAINING

After pressing, strain all juices except citrus and tomato juice through two to four thicknesses of clean, washed

* "Freezing Foods at Home," by Helen Denning and Marion Tate. Available at your Farm Advisor's office or at Public Service Office, 131 University Hall, 2200 University Avenue, Berkeley 4.

is narrow enough in diameter to support the gallon jug by its shoulders. The concentrated juice will drain into the bottom container as it thaws. The draining of the concentrate from the ice should be done in the cold to reduce dilution by melting of ice.

6. When the melting liquid no longer tastes sweetish, turn the gallon jug right side up and discard the remaining ice.

7. Repeat steps 3 through 6 with the melted juice two or three times. This will concentrate most fruit juices to as high as 60 per cent total solids.

8. Fill concentrate into small 6- to 8-ounce freezer containers, leaving 1- to 1½-inch head space. Seal and freeze.

9. To use concentrate, dilute with 3 parts water.

Caution on Spoilage

Never taste or use home-canned or bottled fruit juice or tomato juice that has a disagreeable odor, or any that shows gas pressure in the jar or bottle or any mold on the surface.

DIRECTIONS FOR DISCARDING SPOILED JUICE

1. For safety, open the jar or bottle and, without emptying it, place it and its lid or cap in a kettle which has a tight-fitting lid.

2. Fill the pan with strong soap or detergent solution.

3. Boil for one-half hour. Add more soap solution if necessary to keep the jar or bottle completely covered during the boiling period.

4. Discard entire contents of pan, including jar and closure.

5. Use a household bleach (4 parts water and 1 part bleach) to rinse hands and all articles that have been in contact with the questionable juice. Then wash them thoroughly with soap and water.

Freezing Juice

1. Heat fruit juices, following directions on page 5.

2. Heat tomato juice following directions on page 9.

3. Chill the juice in the refrigerator, or by packing ice around the container.

4. Pour into freezer containers. Leave ½-inch head space for pint containers with wide top opening, ¾-inch head space for those with narrow top opening. Leave 1-inch head space for quart containers with wide top opening, 1½-inch head space for those with narrow top opening.

5. Seal and freeze.

The frozen juice may be defrosted in the refrigerator, at room temperature, or in cold running water. To hasten thawing, shake the container occasionally.

MAKING FROZEN JUICE CONCENTRATE

1. Extract juice as directed, and heat fruit juices following directions on page 5; heat tomato juice following directions on page 9.

2. Chill the juice in the refrigerator, or by packing ice around the container.

3. Pour the juice into gallon jugs, filling them three-fourths full.

4. Seal and freeze.

5. Remove from freezer, open the jug, invert it, and place it over a stainless steel or glazed pottery container that

cheesecloth. Unwashed cheesecloth imparts an unpleasant flavor to the juice.

ADDING SUGAR

If extracted juices need sweetening, add sugar, dissolving it thoroughly before heating the juice.

BLENDING

Blends of juices often have a more pleasing flavor than the individual juices. Apricot, nectarine, or peach purée are excellent when mixed with orange or grapefruit juice. Citrus juices, such as grapefruit and orange, may be blended. Pineapple juice is often blended with orange, grapefruit, or apricot juice.

Fruit juice syrups, prepared by sweetening individual or blended juices, may be frozen and used later for beverages. Add them frozen to water, carbonated water, or ginger ale. Sweetened lemon juice lends itself to the preparation of various beverages. It is better to prepare small quantities of blends until you have found those most pleasing. For better flavor, mix the juices before preserving rather than when you are ready to use them.

Heating or Pasteurizing Juice

Whether you use the double-boiler method or the direct-heat method, you will obtain better results by using a thermometer to gauge the juice temperature accurately.

DOUBLE-BOILER METHOD

This method best retains the fresh flavor of the juice. It is recommended especially for citrus juice. Use a large double boiler and fill the top part no more than two-thirds full of juice. Two pans may be used—a smaller one two-thirds full of juice set in a large pan partly full of boiling water.

1. Bring water in the lower part of the double boiler to a full boil.

2. Pour the juice, sweetened if desired, into the top part of the double boiler, and place over the boiling water.

3. Place thermometer in the juice. Stir until a temperature of 190° F. is reached. Remove the whole double boiler from the heat. Do not set it on a cold surface.

FREEZING

(See page 12 for directions.)

CANNING OR BOTTLING

1. Remove the jars or bottles from the hot water as you need them for filling (see page 2 for general directions on using jars or bottles).

2. Immediately fill each jar or bottle to the brim with hot juice.

Remove any foam and replace with hot juice.

Keep the juice over the hot water when you are not pouring it.

5. Remove jars from the boiling water and tighten seals if lids are not of the self-sealing type.

6. Cool, leaving space between jars or bottles for air to circulate. Do not set on a cold surface or in a draft.

Tomato juice that is cooled as directed on page 8 will have better flavor and color when removed from storage for use.

TOMATO JUICE COCKTAIL or BLENDS

Tomato juice cocktail or blends of tomato juice with other juices may be made and canned or frozen in the same way as tomato juice.

Tomato Juice Cocktail. To each quart of freshly extracted tomato juice, add 2 teaspoons salt, ½ teaspoon grated onion, 1 teaspoon grated celery, ½ teaspoon prepared horseradish, 1½ tablespoons lemon juice, and ⅛ teaspoon Worcestershire sauce.

Tomato Juice Blends. Use one of the following combinations:

1. 4 parts tomato juice and 1 part sauerkraut juice.
2. 8 parts tomato juice and 1 part celery juice.
3. 4 parts tomato juice, 1 part celery juice, 1 part carrot juice.

A small amount of onion juice may be added to any of the three combinations.

FREEZING

(See page 12 for directions.)

CANNING OR BOTTLING

If you use bottles, be sure that they have been treated to withstand heat shock in the boiling water bath. Bottles for carbonated beverages are not safe for this method.

1. Bring the tomato juice to the simmering point (204° F.) immediately after extracting.

2. Fill hot jars with hot juice to within ¼ inch of top. Fill hot bottles to within ½ inch of top.

3. Adjust the jar lids, or cap the bottles.

4. Process in a boiling water bath for 10 minutes.[1]

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[1]TO PROCESS IN A BOILING WATER BATH

Use a deep kettle with a rack and well-fitting lid. The rack should have openings, allow jars or bottles to stand without danger of tilting, and be raised at least ½ inch from the bottom of the kettle. The kettle or canner must be deep enough to permit the water to cover the jars or bottles 1 to 2 inches above the tops, and to allow the water to boil briskly.

Jars or bottles should not touch each other or the sides of the kettle. Heat the water before the hot, filled jars or bottles are placed in the water bath. Add more boiling water if necessary to keep at least 1 to 2 inches of water over the tops of the filled jars or bottles.

Bring the water to the boiling point quickly after adding jars. Start to count the processing time when the water returns to boiling.

The temperature of the juice should not drop below 185° F. If it does, set the double boiler over heat until the temperature again reaches 190° F.

3. If jars are used, tighten lids completely, and invert jars for 3 minutes.

Cap bottles and turn upside down immediately for 5 minutes.

Do not set the hot jars or bottles on a cold surface or in a draft.

DIRECT-HEAT METHOD

This method yields juice with a cooked taste. Juice may be prepared by this method without a thermometer, but better results are obtained if one is used.

Bring juice to the simmering point, or 195° F., over direct heat. If available, use an asbestos pad under the pan. Stir the juice gently while it is heating.

FREEZING

(See page 12 for directions.)

CANNING OR BOTTLING

1. Remove the jars or bottles from the hot water as you need them for filling (see page 2 for general directions on using jars or bottles).

2. Immediately fill each jar or bottle to the brim with hot juice.

Remove any foam and replace with hot juice.

Reheat the juice when necessary so that it remains near the simmering point (190° F.) until all the juice is poured.

3. If jars are used, tighten lids completely, and invert the jars for 2 or 3 minutes.

Cap bottles and turn upside down immediately 5 minutes. Do not set hot jars or bottles on a cold surface or in a draft.

COOLING JARS or BOTTLES

1. After inverting jars or bottles for the time directed, lower them into a large container of water which is just too hot to allow the hand to remain in it comfortably (120° F).

2. After 5 minutes, pour out one-third of the water in the container and refill with cold water from the tap.

3. Repeat after another 5-minute interval. Then place container under cold running water for another 5 minutes. Do not let cold water run directly onto a jar or bottle.

The juice will cool to the temperature of the cold water in from 20 to 30 minutes in bottles, and in from 30 to 40 minutes in jars.

STORING JUICE

Wipe containers dry and store in a cool, dark, dry place. The colder the storage temperature, the longer the juice will retain its fresh flavor, color, and vitamin content.

If a dark storage place is not available, wrap containers in paper, or place containers in cardboard cases.

Properly prepared juices will not spoil, even when stored in a warm place. However, the juices will gradually lose flavor, color, and vitamin content if they are stored at temperatures of 60° to 70° F. The loss is rapid at temperatures above 70° F. Storage life is prolonged at 32° to 40° F.

Preserving Tomato Juice

Tomato juice should be processed in a boiling water bath, or frozen.

1. Use only sound tomatoes, well ripened and deep in color. Wash thoroughly. Peel, core, and cut into pieces.

2. Either cook tomatoes until soft, or extract juice from uncooked tomatoes.

3. Cook the tomatoes as quickly as possible after cutting to inactivate the enzymes responsible for changes in consistency and loss of vitamin C.

4. When the juice is extracted from uncooked tomatoes, this should be done as quickly as possible with minimum exposure to air. Heat the extracted and strained juice promptly.

5. Press through a fine colander or sieve to remove seeds and smooth the texture.

6. Add one teaspoon salt to each quart, or salt to taste.

4-H FOOD PRESERVATION

Member's Project Outline

Hundreds of years ago, man began growing food to feed himself and his family. As time went on, agriculture progressed and soon man grew bigger and better crops. But times were uncertain and no one ever knew if his crops would be good the next year. So, instead of wasting food one year and starving the next, people learned how to preserve their food so they would always have enough to eat.

Food preservation can be lots of fun. There's a wonderful, secure feeling in having a pantry with rows of jars of rich golden peaches or opening the freezer and seeing neat containers of vegetables quick-frozen at their peak. You can be proud to add crisp pickles or tangy relishes to the chops or hamburgers you serve, or to pack a snack of jerky or fruit leather the next time you embark on a hike or bicycle safari.

The outlines in this leaflet will give you reliable information. It is important to follow directions so that you are sure the food you preserve is safe and nutritious. Bacteria, molds, and yeasts are organisms that cause food to spoil. Undesirable changes in flavor, color, and texture are caused by chemical agents called enzymes. Destruction of these spoilage organisms and enzymes is the object of food preservation. The list of references in this leaflet will give you reliable information.

You, your parents and leader will need to decide which projects you should finish before going on to the next outline. It will probably take more than one year for each outline.

When deciding what methods you want to learn and which foods you want to work with, consider what your family likes. Also consider the availability of the food with which you want to work. Leaflet #2404, *Buying Calendar for Fresh Fruits and Vegetables* will give you some hints on availability. The important thing in your 4-H project is learning how to preserve food. Don't put your emphasis on preserving a quantity of food that may not be eaten.

Cooperative Extension leaflets have most of the information needed to complete the projects we have outlined. For help in following the directions, contact your leader. Other sources of help include your 4-H youth advisor or an advanced 4-H member.

An artist paints his picture on canvas. You, too, can be an artist by making a pretty picture in a jar for the pantry shelf, or in a package for the freezer. As a food preservation artist you must select proper ingredients, mix them correctly, and then arrange them in an attractive manner to make a picture of food well-preserved.

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Division of Agriculture and Natural Resources

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Successful food preservation begins with good quality ingredients and reliable methods. Cooperative Extension has several leaflets which contain carefully tested methods. These leaflets are available from your Cooperative Extension office (county farm and home advisor's office). Before beginning any food preservation project, get the leaflets you will need and do your homework.

CANNING

Leaflet #21392
Home Canning of Fruits and Vegetables
Leaflet #2270
Home Canning of Vegetables
Leaflet #2423
Bottling, Canning, Freezing Fruit Juices and Tomato Juice
Leaflet #7023
Canning Apricots, Peaches, and Plums
Leaflet #2425
Canning and Freezing Fish at Home

JAMS AND JELLIES

Leaflet #2803
Making Jellies, Jams, and Preserves

DRYING

Leaflet #2785
Drying Foods at Home
Leaflet #7160
Sun-Drying Apricots and Peaches at Home

FREEZING

Leaflet #2713
Home Freezing of Fruits
Leaflet #2724
Home Freezing of Vegetables
Leaflet #2725
Home Freezing of Meat, Poultry, Fish, and Shellfish
Leaflet #2751
Freezing Prepared Foods at Home

PICKLING

Leaflet #4080
Safe Methods for Preparing Pickles, Relishes, and Chutneys
Leaflet #2758
Home Pickling of Olives

OTHER LEAFLETS

Leaflet #2669
Smoking Fish at Home
Leaflet #7019
Home Storage of Nuts, Cereals, Dried Fruits, and Other Dried Products
Leaflet #2415
How to Make Neufchatel Cheese
Leaflet #2414
How to Make an American-Type Cheese

Not all the information necessary for some of the *Special Projects* outline is found in Extension leaflets. Your leader or 4-H youth advisor will help you find the other sources you will need.

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4-H YOUTH FOOD PRESERVATION PROJECT

Outline for a Beginners Unit

Canning

LEARN — **COMPLETED?**

- Basic classification of foods — acid, low acid, etc. ☐
- Kinds of canners and when to use which. ☐
- About canning jars, lids, and other necessary equipment. ☐
- About seasonal availability of food — when food is plentiful and least expensive. ☐
- The recommended canning method, time, and temperature for fruits and tomatoes. ☐

DO

- Help select fruit or tomatoes for canning. ☐
- Learn to use the water bath canner. ☐
- Assemble equipment, wash jars. ☐
- Learn how to wash and prepare fruit for canning (peeling, quartering, etc.). ☐
- Learn how to fill jars, remove air bubbles, etc. ☐
- Help can three fruits or two fruits and tomatoes. ☐
- Learn to check for a seal. ☐
- Learn how to label and store canned foods. ☐
- Judge product for taste, color, and for safe keeping qualities. ☐

EXPLORE

- The cost of a home canned product versus a like product commercially canned. ☐
- Ways to serve the canned foods to the family. List five. ☐

Jams and Jellies

LEARN

- Methods for making jams and jellies. ☐
- When the best fruits for jam and jelly are available. ☐

DO

- Select and prepare fruit for jam. ☐
- Make a freezer jam with commercial pectin. ☐
- Select proper containers for freezer jam. ☐
- Label and store jam. ☐
- Judge jam for color, flavor, and texture. ☐

EXPLORE

- Ways to serve jam to the family. List five. ☐
- The cost of a jar of jam and compare this with an equal weight at the supermarket. ☐
- The keeping quality of jam. After several months, check for "freezer burn" or other changes. ☐

Drying

LEARN

How drying preserves food. ☐
Different ways to dry food. ☐

DO

Select fruit for making leather. ☐
Make and dry one or two different kinds of fruit leather. Try a combination of fruits. ☐
Select meat for jerky. ☐
Follow directions for sun or oven drying jerky. ☐
Select the proper packaging for leather and jerky. ☐
Label and store dried product as recommended. ☐
Judge leather and jerky for color, flavor, and texture. ☐

EXPLORE

The values of sun drying versus oven or dehydrator drying. ☐
The effect of lemon juice or ascorbic acid on the color and flavor of fruit leather. Make one roll of fruit leather (light colored fruit) with lemon juice and one without. Compare. ☐
The values of dried food as snacks. ☐

Freezing

LEARN

How freezing preserves food. ☐
Which containers are suitable for the freezing process. ☐
How to select food for freezing. ☐
How to seal containers for freezing. Why is the seal important? ☐
How to prepare foods for freezing. ☐

DO

Quick freeze loose berries with dry sugar or without any sugar. ☐
Freeze fruit in syrup containing crystaline ascorbic acid. ☐
Judge frozen fruit for color, taste, and texture. ☐
Make up a display of freezer containers. ☐

EXPLORE

The differences in berries frozen at different temperatures. Which gives the best results? ☐
The characteristics of freezer burn. How can this be avoided? ☐

Using the basic directions in *Drying Foods at Home*, try one of these jerky variations.

SPICY JERKY

- 2 pounds very lean, boneless beef
- 1 ½ teaspoons seasoned salt
- 1 ½ teaspoons onion powder
- ½ teaspoon black pepper
- ½ teaspoon garlic powder
- ¼ cup soy sauce
- ½ cup Worcestershire sauce

Combine the seasonings, pour over the meat strips (use a large bowl), and mix gently. Cover and refrigerate overnight, or for at least 6 hours. Stir occasionally while refrigerating. Dry according to the directions given in the leaflet.

ORIENTAL JERKY

- 2 pounds very lean, boneless beef
- 1 ½ teaspoons sugar
- 1 cup soy sauce
- 1 clove garlic, minced or mashed.
- 1 teaspoon grated ginger root or ½ teaspoon ground ginger

Follow the directions for spicy jerky.

Outline for an Intermediate Unit

Canning

LEARN

- ☐ How to acidify foods for canning by the water bath method.
- ☐ More about syrups to use in canning fruit and about canning fruit without sweetening.
- ☐ How to select reliable recipes for pickles and relishes.
- ☐ The variety of vegetables that are best for pickling.
- ☐ How to can fruit juice and tomato juice.
- ☐ To judge canned juices and relishes.

DO

- ☐ Review what you learned about the classification of foods.
- ☐ Can a variety of fruits (three or four) using different strength syrups.
- ☐ Make quick pickled cucumbers.
- ☐ Make a pickled relish or salsa.
- ☐ Pickle a vegetable or mixture of vegetables.
- ☐ Prepare fruit or tomato juice and can it.

EXPLORE

- ☐ Canning fruit with fruit juice rather than syrup.
- ☐ Pickling fruit.
- ☐ Ways to teach the use of the water bath to a younger group.
- ☐ With your family, the annual need for canned fruit.
- ☐ The cost of home canned foods versus those available at the supermarket.
- ☐ Safety practices for pickling.
- ☐ Ways to use syrup left from canned fruit and ways to use leftover pickle brine.
- ☐ The effect of improperly storing canned fruits by placing one jar in a hot, damp location and another in a cool, dry, dark location. After several months, compare.

Jams and Jellies

LEARN

- ☐ More methods for jam and jelly making.
- ☐ About straining juice for jelly.
- ☐ To judge jams and jellies.

DO

- ☐ Make cooked jam with commercial pectin.
- ☐ Make cooked jelly with commercial pectin.

EXPLORE

- ☐ How to test fruit for acid and pectin content, and to determine which ones need added pectin or acid.
- ☐ Recipes for conserves, preserves, and marmalade. Try one.

Drying

LEARN

- ☐ To sulfur light colored fruits for drying.

To blanch vegetables before drying. ☐
Different types of antioxidants (anti-darkening agents); and the advantages and disadvantages of each. ☐
To package and store dried foods. ☐
About shade drying of herbs. ☐

DO

Sulfur and dry a light colored fruit. ☐
Blanch and dry a vegetable. ☐
Dry a vegetable that doesn't require blanching. ☐
Dry herbs. ☐
Judge dried foods. ☐

EXPLORE

Two different ways of using dried vegetables. ☐
Time of re-hydration and quality of re-hydrated vegetables. ☐
The best way to dry vegetables; sun, oven, or dehydrator. ☐
Different ways of using dried fruits. ☐

Freezing

LEARN

Which foods freeze and thaw well. ☐
How long different foods can be kept frozen without quality loss. ☐
How to thaw foods safely, and when it's okay to refreeze. ☐
About blanching vegetables for the freezer. ☐
About air-cooling versus water-cooling of blanched vegetables. ☐
About freezing prepared foods. ☐

DO

Blanch and freeze three or four different vegetables. ☐
Freeze cookies, baked and unbaked. ☐
Freeze a homemade TV dinner. ☐
Properly thaw and prepare frozen prepared food. Serve. ☐
Prepare and serve frozen vegetables. ☐

EXPLORE

Quality losses of frozen foods (texture, color, taste). ☐
Ways to keep records of food going in and coming out of the freezer. ☐
The differences in blanched, unblanched, and overblanched green beans. ☐
Energy costs of frozen foods compared with other methods of preserving and storing foods. ☐

Storage of Nuts

LEARN

About the effects of time, temperature, and oxygen on the flavor of nuts. ☐
Ways to prevent insect infestation. ☐
Ways to increase the shelf life of shelled nuts. ☐

DO

Store shelled nut meats in proper containers at room temperature, refrigerator temperature, and in the freezer. At 2 week intervals, taste and record any signs of rancidity. ☐
From the same group of nuts, store some in the shell in a cool, dry place. Check these at 2 week intervals for signs of rancidity. ☐
Record any insect infestation in the four groups of nuts. ☐
Store nuts in a modified atmosphere (if available) using dry ice (solid carbon dioxide). Record insect infestation and rancidity. ☐

EXPLORE

After completing this experiment, explain which is the best method for storing nuts. Why? ☐

Outline for an Advanced Unit

Canning

LEARN

How to use the pressure canner. ☐
Methods for canning vegetables and meats. ☐
To judge canned meats and vegetables for color, texture, pack, and seal. ☐

DO

Can two or three different vegetables. ☐
Can meat, poultry, or fish. ☐

EXPLORE

Methods to use in telling or showing others how to safely can vegetables and meats. ☐
Needs for canned foods for one year for the family. Which of the foods can be preserved more cheaply at home. ☐
The types of spoilage that occur in canned food. ☐

Jams and Jellies

LEARN

Which fruits have enough pectin and acid for the long boil method. ☐

DO

Make 3 or 4 jams and jellies by the long boil method. ☐
Compare taste, texture, and color to those made with commercial pectin or by freezer method. ☐

EXPLORE

Jelling problems as they are related to acid, pectin, and sugar content. ☐
One of the low sugar or artificial sweetner jams. Compare. ☐

Fermentation and Brining

LEARN

About lactic acid fermentation of cucumbers and cabbage. ☐
What causes spoilage problems in fermented foods. ☐
The salt brining process for vegetables. ☐

DO

Make fermented dill pickles or green tomatoes. ☐
Make sauerkraut. ☐
Can the pickles and sauerkraut. ☐
Make brined vegetables. ☐

EXPLORE

The effect of temperature on fermentation. ☐
Pickle recipes using freshened, brined pickles. ☐
The effect of surface scum and mold on fermented pickles. ☐

Special Interest Projects

Drying

- [ ] Study the different types of dehydrators.
- [ ] Build and use a dehydrator (optional).
- [ ] Study the benefits of pretreatments; both quality and nutritional.
- [ ] Develop recipes using dried foods.

Yoghurt and Cheese

- [ ] Learn about cheesemaking.
- [ ] Make 2 or 3 different types of cheese.
- [ ] Learn how to properly age cheese.
- [ ] Make yoghurt.

Sausage

- [ ] Study sausage making.
- [ ] Make 2 or 3 different types of sausages.

Smoking

- [ ] Learn about smoking fish and meats.
- [ ] Build a smoker.
- [ ] Smoke some fish.
- [ ] Learn about proper storage for different kinds of smoked foods.

Root Cellaring

- [ ] Learn about storage temperatures of fresh fruits and vegetables.
- [ ] Learn about wax coatings for fresh fruits and vegetables.
- [ ] Determine the shelf life at root cellar temperatures for a variety of fresh fruits and vegetables.

Olives

- [ ] Learn about methods of olive preparation.
- [ ] Make lye-cured olives and brined or fermented olives.
- [ ] Preserve olives by canning or under proper conditions in a crock.

Storage of Dried Foods, Grains, and Nuts

- [ ] Learn about storage problems.
- [ ] Store a variety of foods using different methods of pasteurization, modified atmospheres, and temperatures.
- [ ] Study and use different containers.