

How to Can Fruits and Vegetables at Home

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HOW TO CAN FRUITS AND VEGETABLES AT HOME

Brief Table of Contents

	PAGE
Amounts to can.....	3
Equipment and how to use it.....	4
To can with and without sugar.....	6
Approximate yield of products.....	7
General directions for canning.....	7
Methods of canning.....	8
To use the pressure cooker.....	11
Time tables.....	14 to 17
To can in pressure saucepan.....	22
Open kettle method.....	23
Oven canning.....	23
Caution.....	24
Adding vitamin C.....	24
Dry salting vegetables.....	25
Home drying.....	28
Jelly.....	30

This bulletin is one of a series on home canning. The series include:

- Bulletin 378: How to Can Meats and Poultry
- Bulletin 379: How to Can Fruits and Vegetables at Home
- Bulletin 382: How to Can Fish at Home

Farm families must depend, in part, upon canned products in order to provide nutritious and well-balanced meals throughout the year. Wise homemakers have for years planned gardens to have enough of the right kinds of vegetables for use fresh in summer and canned and stored in winter. They plan especially for liberal quantities of tomatoes and of green, leafy, and yellow vegetables.

AMOUNT TO CAN FOR THE FAMILY

To know how many quarts or pints to can per person for a period of time, it is necessary to make a plan or budget that will answer the following questions:

1. How many meals will be served during the period?
2. At how many meals is the food in question to be served?
3. How large is each serving to be?

As an example take tomatoes for a period of one year, or 52 weeks. In Maine tomatoes can be had fresh from the home garden for about 12 weeks. This leaves 40 weeks for which canned tomato must be planned. Forty weeks times 7 days per week makes 280 servings if tomato is to be served every day as juice or as vegetable. Ordinary servings range from $\frac{1}{2}$ cup to 1 cup per person. Since there are 4 cups to a quart, we calculate 35 quarts per person if $\frac{1}{2}$ cup servings, and 70 quarts per person if 1 cup servings are planned for.

If, instead of 7 days per week, tomato is served 5 days per week, the number of servings will be 40 weeks times 5 days per week or 200 servings. Calculating as before: if $\frac{1}{2}$ cup servings are used, 25 quarts per person will be required; and if 1 cup servings, then 50 quarts will be required.

This budget for one person is multiplied by the number of persons to be planned for during the period under consideration. Requirements for any canned food can be calculated in the same way.

WHY FOODS SPOIL

The real reason for canning is to prevent spoilage. When fruits or vegetables spoil—that is, ferment, decay, or turn sour—

spoilage is due to the growth of certain tiny living organisms, some of which are so small they can be seen only through a microscope. They are called molds, yeast, and bacteria. They are everywhere in the air, in water, on fruits and vegetables, and in great numbers in soil and dust.

Sugar, in the amounts used per quart in making sirups, has no value as a preservative. Any fruit canned without sugar will keep if properly packed and sealed.

"Canning powders" should not be used in canning. Some of them may be harmful. The safe way for the Maine homemaker to can is to follow directions and process foods with heat at temperatures that are backed up by scientific research.

SELECTION OF FRESH PRODUCTS

Can all fruits and vegetables as soon as possible after they are gathered. There is a difference in the keeping qualities of vegetables canned fresh and of those gathered several days or hours before canning. Some vegetables, such as corn and peas, are likely to develop flat sour if they are not canned soon after gathering. "An hour from the garden to the can" is a good slogan to follow.

PROCESSING

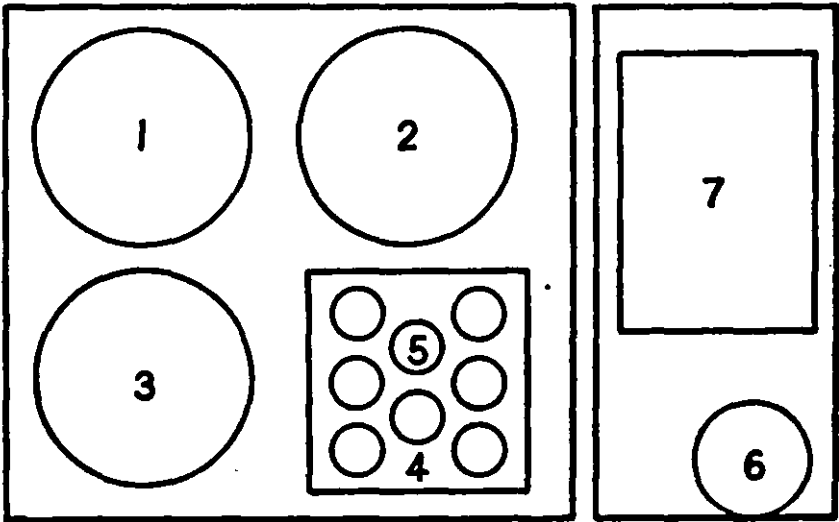
Processing means cooking the jars or cans of food for a long enough time at temperature that will insure their keeping. Refer to the timetables on pages 14 to 17 for processing in the boiling-water bath and in the pressure cooker.

Processing is a most important step in canning. No matter how well all other steps are taken, if the processing is not thorough, foods may spoil. Sterilizing heat must reach the center of the jar or can and raise the temperature there high enough to kill spoilage organisms. That is why squat, fat jars require longer processing than tall, thin ones. Timetables should be followed exactly. Food that has been properly packed, processed, and sealed will keep indefinitely.

EQUIPMENT AND HOW TO USE IT

Prepare for the canning season by checking over ahead of time the equipment that will be needed. Special equipment should also

be made ready. This will prevent delays when food is ready to be canned. A help to the busy homemaker is to set up a canning corner or shelf with all canning equipment ready to use. It will save many steps and make for an easier canning season. See the drawing below.



This Drawing Shows Stove Top Set up as Canning Center to Save Steps and Time.

1. Tea kettle with boiling water.
2. Canner with boiling water ready to receive filled jars or cans.
3. Kettle with hot food ready to be put into jars or cans.
4. Shallow pan with hot water in which jars are inverted for sterilizing and keeping hot. This canner holds 7 jars. Have an extra jar in case of breakage.
5. Jar turned right side up ready to be filled, kept in the hot water to keep the jar and the food hot until the jar or can is sealed.
6. Tin-can sealer ready to use when needed.
7. Tray to hold covers, holders, small equipment.

Kettles used for canning should be of enamelware, aluminum, retinned metal, glass or stainless steel in good condition. Copper and galvanized iron utensils should not be used as their salts are poisonous.

If a recipe calls for allowing food to stand over night in sugar or vinegar, use an earthenware crock in good condition or large

glass containers. Sometimes on standing, food eats off the surface of a metal kettle and both food and kettle are spoiled.

TO CAN WITH SUGAR

Sugar in the amount used in canning is not a preservative.

Directions for Making Sirup

Sirup	Amount
Medium	1 cup sugar to 2 of liquid
Thin	1 cup sugar to 3 of liquid
Very Thin	1 cup sugar to 5 of liquid

Heat liquid, add sugar gradually. Heat only until the sugar dissolves. When using small amounts of sugar for canning, about $\frac{1}{8}$ teaspoon of salt added to a quart of fruit will improve the flavor.

TO CAN WITH SUGAR SUBSTITUTES

Substitute up to one half of the sweetening with an equal amount of honey, or up to one third of the sweetening with an equal amount of corn sirup. Honey adds a flavor of its own.

TO CAN WITHOUT SUGAR

This method is used to can fruits for those on a sugar restricted diet.

Use ripe and sweet fruits. Extract the juice from the riper fruits by crushing, heating, and straining. Use this juice to cover the fruits in the jar. Pack closely the fruits to be canned into containers without precooking. Add boiling-hot juice to cover. Adjust tops and process the required time. Or:

Give the fruits a short precooking of 2 to 4 minutes simmering, pour into containers, seal, and process the time required.

Apples, peaches, and pears require the addition of water. Use only the smallest quantity of water necessary to fill the jars.

When preparing apples, peaches, and pears drop them into cold salt water ($\frac{1}{2}$ tablespoon per quart) to prevent discoloring.

APPROXIMATE YIELD OF PRODUCTS

Raw	Canned
1 bu. apples	17 qts.
1 bu. shell beans	16 pts.
1 bu. string beans	16 qts.
32 qts. blackberries	24 qts.
32 qts. blueberries	16 qts.
100 ears corn	20 pts.
1 bu. greens	4 to 6 qts.
1 bu. peaches (sliced)	16 qts.
1 bu. pears	30 qts.
1 bu. peas in pod	14 pts.
32 qts. plums	30 qts.
32 qts. raspberries	16 qts.
32 qts. strawberries	16 qts.
1 bu. tomatoes	15 to 18 qts.

GENERAL DIRECTIONS FOR CANNING

1. Have all canning equipment clean and in first-class order before the actual day of canning.
2. Use fresh, sound, mature produce. Wash thoroughly by lifting produce from wash waters. "An hour from the garden to the can" is a good slogan. Do only a canner load at a time.
3. Place jars mouth down in a shallow pan containing about one inch of water. Heat jars and glass covers and keep hot until needed.
4. Put a clean rubber on the jar. Pack the raw or the precooked produce into clean, tested jars and cover with hot juice, boiling sirup, or boiling water to $\frac{1}{4}$ inch from the top for fruit, 1 inch for peas, corn, baked or shell beans, $\frac{1}{2}$ inch for all other vegetables. Make sure that there are no air pockets. A clean silver knife run around the inside of a full jar will help break up any air pockets.
Cut through jars of greens to let liquid into the center of jar. Avoid too tight a pack
If tin cans are used with cold produce, exhaust before sealing. See "Exhausting or Precooking."
5. When jars are full, prepare them for processing. Make certain that the mouth of the jar is clean. Then:

- a. *If wire bail jar*: place upper wire to hold lid in place, leave lower wire up until processing is finished.
- b. *If two-piece metal lid with screw band*: adjust top and screw on completely or follow manufacturer's directions.
- c. *If old-fashioned zinc screw-top jar* or a jar with the new three-piece (screw-band, glass-lid, and rubber-ring) cover: screw top securely and give a quarter turn back until processing is finished, or follow manufacturer's directions.
6. Place jars in the processing bath so that they do not touch each other.
7. Process for required length of time for method used. Follow directions carefully.
8. Remove jars carefully. Adjust covers so that all are clamped or screwed on completely. Allow jars to cool right side up and out of drafts.
9. After cooling (next day) test jars for completeness of seal.
 - a. Remove the wire bail or the screw band, lift the jar by the cover. A good seal sticks.
 - b. Remove screw band from lacquered metal-top jars. Tap with a silver spoon. A clear ringing sound denotes a seal. If the sound is dull, a seal has not been formed. The screw band need not be replaced.
10. Store perfectly sealed jars in a cool, dry, dark place.

Examine canned goods every day or so for a period of 2 weeks and then once a week for a while to make sure that the products are keeping without spoilage.

Guard against sudden drops in temperature. The accidental freezing of canned goods does not cause spoilage if jars are not broken and tin cans are not burst or "made leaky" by bulges in the seams. Use such foods as soon as possible, and if much damage is done, keep the foods frozen until they can be used.

METHODS OF CANNING

The methods of canning recommended are (1) the boiling-water bath for foods which are acid, such as fruits, rhubarb, and tomatoes and (2) the steam pressure-cooker method for foods that are not acid.

By the first method the glass jars or the tin cans containing the

food are placed on a rack in a water-bath container which is deep enough for boiling water to cover the tops of the jars at least one inch. Jars are placed on a rack to keep them off the bottom of the bath. The bath water must be kept boiling hard all the processing time. Count the processing time from the time the water actually boils. If water boils away, add boiling water. The temperature reached is 212° F.

Boiling-Water-Bath Canner

Food products in glass jars or tin cans may be processed in boiling water in a homemade boiling-water-bath outfit, such as a clean wash boiler, lard pail, or any receptacle of sufficient size which has a tight cover. Any such homemade cooker must be fitted with a wooden, wire, or metal rack which will raise the jars from the bottom of the canner and allow the free circulation of water under them. A wooden rack will float unless it is weighted. A wire basket may be used. This makes it possible to lift a large number of jars in and out of the canner at one time. The receptacle should be deep enough to allow the *water to come 1 to 2 inches over the tops of the jars or cans*. Be sure that the jars or cans are far enough apart so that water can circulate freely under, around, and over them. Some people prefer to buy an outfit made especially for home canning. The boiling-water-bath outfits sold by manufacturers are equipped with trays and lifting handles.

The steam pressure-cooker method is used for foods which are not acid, such as peas, beans, greens, asparagus, corn, carrots, and beets. In this method the higher temperatures reached (240° to 250° F.) kill heat-resistant bacteria.

Pressure Cookers

A pressure cooker is a kettle so built that steam cannot escape when its outlets are closed. The confined steam creates pressure, and a temperature higher than boiling results.

Pressure cookers at the present time are made of aluminum, all steel, and tinned and enameled steel.

Aluminum cookers may be made from wrought or cast metal. Cast aluminum pits easily and takes on odors and flavors. Wrought

aluminum pits less readily than does the cast. Sudden changes of temperature in an aluminum cooker may cause it to warp and crack.

All-steel cookers stain but are satisfactory.

Tinned and enameled steel cookers must be handled with care. Bumping and dropping may scratch them and make them chip easily. Once scratched or chipped, rusting follows. They cannot be used without water, as for searing meats, because the tin may melt and the enamel chip off.

If no air is present in the cooker, the relationships between pressure and temperature are:

Pounds of Pressure Above Atmospheric Pressure at Sea Level	Approximate Temperature Inside Cooker During Processing
0	212° F.
5	228° F.
10	240° F.
15	250° F.

Gauges must be accurate to register the temperatures corresponding to the pressures given.

The pressure cooker is more expensive to buy than a boiling-water-bath outfit, but for meats and all vegetables except tomatoes its use is the safest way to avoid spoilage. The amount of spoiled goods which would pay for a pressure cooker is not so very great. For the average farm family, an 18-quart cooker is practical for both canning and cooking.

Various types of pressure cookers are on the market. On some, the cover is fastened by several clamps attached either to the cover or to the kettle itself; on others, a ring clamps around both cover and kettle rims. The important parts of a pressure cooker are: (1) the safety valve—to allow the steam to “blow off” when the pressure reaches the safety limit—usually set at 20 pounds; (2) the petcock—to let out the air when the cooker is started and to lower the pressure when the cooking or canning is finished; (3) the gauge—to indicate the pressure; (4) proper closure—to insure a steam-tight seal of the cooker while processing. The safety valve and petcock are combined on many of the newer cookers and make an adjustable safety valve.

TO USE THE PRESSURE COOKER

1. Follow the printed directions for use of the pressure cooker which came with it. Put in 1 to 3 quarts hot water, leave the petcock open.
2. Place filled jars or cans in the pressure cooker for processing so that they do not touch each other.
3. Replace cover on pressure cooker.
4. Close cooker.
5. Leave petcock open until a steady stream of steam has appeared for 10 minutes. This shows that all air has been driven out. Close petcock or put on required weight.
6. Let pressure rise to the specified number of pounds pressure and keep it there. Uneven pressure pulls the liquid from the glass jars of food.
7. Process for required time.
8. Remove cooker from source of heat.
9. Allow cooker to cool to "0" pressure before opening petcock if the containers are glass. If tin is used, open petcock at once, but open slowly.
10. When pressure reaches "0," remove cooker cover by tilting it in such a way that any steam will be directed away from the face. Remove jars carefully.
11. Follow Numbers 8, 9, and 10 under "General Directions." Page 8.

A pressure cooker is a delicately adjusted instrument and should be handled with care.

Care of the Pressure Cooker

1. The cooker should be washed thoroughly with scalding soapy water only, then rinsed and dried. The cover should be washed with a cloth wrung from soapy water and rinsed with a cloth wrung from clear hot water, and wiped dry.
2. Never let the pressure gauge get wet. The gauge should be checked for accuracy with a master gauge or with a maximum thermometer at least once a year, oftener if there is any doubt as to its reliability. County extension agents have gauge testers. Any doubtful gauge should be sent to the factory for repair. The opening to the gauge

- should be kept free from water and food particles. Use a toothpick to clean it.
3. Take the petcock apart after each using, wash the ball and ball seat, and wipe dry. Oil it occasionally.
 4. Never put the cooker away with the cover on tight as stale tastes may get into the food, no matter how carefully the cooker was washed. The cover may be put away separately beside the cooker and should be stored right side up.

Glass Jars

Any glass jar that can be tightly sealed may be used for canning. Products look more attractive in jars of colorless glass than of green glass. Half-pint jars are often desirable when canning food for the baby or the school lunch.

Whether pint or quart jars are used should be determined by the kind and amount of the product needed by the family for one meal.

There are several types of jars. One, known as lightning type, has an all-glass top. This uses a shoulder rubber ring and the top is held in place with a wire clamp.

Mason jars have several kinds of tops: (1) a one-piece screw top, usually made of zinc with a porcelain lining, with a rubber ring between the top and the shoulder of the jar; (2) a glass cap with a rubber ring which fits between the glass cap and the jar top, both of which are held in place with a metal screw band (this ring is called a top rubber); (3) a metal disk with a flowed-on gasket (the disk is held on the jar by a metal screw band). Types (2) and (3) are sometimes called self-sealing or vacuum types.

Peanut butter jars, mayonnaise jars, coffee jars, and other commercial jars may be used for home canning if the jar mouths are threaded so that they will take one of the standard tops which will seal air tight. The width across the entire neck of the jar must be that of a standard Mason fruit jar or such that the sealing edge of the jar will center all the way around on the sealing composition. When the neck of the jar is a small fraction of an inch off standard, the side of the sealing edge of the jar rides up on the tiny edge of the lid instead of turning down over the neck of the jar. Some odd jars also have a flange set high on the neck which

will not permit the screw band to tighten down far enough to exert a good firm pressure on the lid.

The processing time for odd jars depends upon the thickness through them. Sterilizing heat must penetrate to the center of the jar if the food is to keep.

Use regular jars for canning meat, poultry, fish, and nonacid vegetables.

Care of Jars and Testing Jars and Rubbers

Care of Jars

Before doing any canning, be sure your jars are in proper condition. Bring the jars out of storage and wash them thoroughly in hot, soapy water. Jars which had spoiled foods in them should be given a thorough washing with strong soap and soda and then covered with a strong soda solution ($\frac{1}{2}$ cup soda to 4 quarts of water) and boiled for 10 minutes in an agate pan (never aluminum). If this is not done, molds from one jar may be spread over every jar washed in that particular wash water. Scrub around the wires with a stiff brush to remove the dust, dirt, or rust that accumulates there. Rinse jars and covers thoroughly with hot water and drain.

Before using a glass jar, run a finger around the top and the cover where the cover comes in contact with the jar to see that there are no nicks or cracks which may permit bacteria to enter, even after the rubber and cover are in place.

When using a jar with a glass top, try the cover to see if it fits well before putting on the rubber. If the glass is warped so that the cover rocks back and forth when tapped on one edge, another cover should be used.

Screw tops often become bent so that they do not make a tight seal. When this happens, it is difficult to pound the edge into shape successfully. To test screw tops, put them on without the rubber, screw down tightly, and run the thumbnail along the edge of the metal where it meets the glass. If the thumbnail slips under the edge, the top does not fit the jar.

Screw bands should be examined to make sure that they fit the jars for which they were bought. If canning is done on more than one day, screw bands on a set of finished jars may be re-

Time Table for Canning Fruits by BOILING-WATER BATH

Product	Temperature at center of can at time of sealing*	Procedure	Container When using tin cans	Time of Processing	
				Boiling Water—212°F.	
				Qts. and Pts. Glass	#2 Can Tin
Apples	190° F.	(1) Pare and core; cut in slices, quarters, or halves and cook in thin sirup or hot water until tender.	Plain	15 Min.	15 Min.
		(2) Make into apple sauce and pack hot in hot jars.	"	10 Min.	10 Min.
		(3) Pare, core, and cut; pack in jars, and cover with boiling sirup or hot water. If tin cans are used, seal at once.	"	15 Min.	10 Min.
Berries Blackberries Blueberries Currants Gooseberries Raspberries Strawberries	170° F.	Wash and stem berries. Cold Pack.—Pack fruit into jars. Fill with boiling hot sirup or juice.	R Enamel	20 Min.	15 Min.
		Hot Pack.—Precook 2 to 5 minutes.	"	5 Min.	5 Min.
Cherries	170° F.	Pitted or not. Pack raw; cover with hot sirup or hot water.	R Enamel	25 Min.	20 Min.
		Precook and pack boiling hot in hot jars.	"	5 Min.	5 Min.
Peaches	160° F.	Scald, cold dip, peel, halve. } Soft Pack raw; cover with hot } Firm sirup or hot water.	Plain	25 Min. 35 Min.	20 Min. 30 Min.
		Precook and pack hot into hot jars.	"	15 Min.	15 Min.
Pears	170° F.	Can when ripe. Peel, cut in halves, core, and drop in salt water bath of 1 tablespoon salt to 1 quart water. Remove and cook gently in boiling sirup or hot water 4 to 8 minutes. Pack hot in hot jars and fill containers with boiling sirup or hot water.	Plain	20 Min.	20 Min.
Plums		(1) Prick. Pack in hot jars, and cover with boiling sirup or hot water.	R Enamel	20 Min.	15 Min.
		(2) Bring to boil with just enough water to keep from burning. Pack hot into hot jars.	"	5 Min.	5 Min.

* If troubled with spoilage, check sealing temperatures with the ones given. A dairy thermometer can be used.

Time Table for Canning Fruits by BOILING-WATER BATH—Con.

Product	Temperature at center of can at time of sealing*	Procedure	Container	Time of Processing	
				Boiling Water—212° F.	
			When using tin cans	Qts. and Pts.	#2 Can
			Glass	Tin	
Rhubarb		Cut in ½ inch lengths. Pack into jars and cover with boiling hot sirup or hot water.	Do not use tin	20 Min.	—
		Precook 2 to 5 minutes and pack hot into hot jars.	"	5 Min.	—
Tomatoes Use only sound tomatoes	145° F.	Let stand in boiling water for about a minute or until skins are loosened. Dip in cold water, cut out stems, and remove skins. (1) Heat to boiling and pack hot in hot containers.	Plain	10 Min.	10 Min.
		(2) Pack raw.	"	45 Min.	35 Min.
Tomato Juice Use only sound tomatoes	145° F.	Wash tomatoes well, remove stems, and cut in small pieces. Make in small quantities—not over 2 gals. at a time, avoiding any delay. Precook tomatoes by simmering until softened. Put softened hot tomatoes through a fine sieve. Keep out as much air as possible. Add salt. Re-heat just to boiling and pour into clean hot containers and seal. Leave no head space.	Plain	15 Min.	15 Min.
Tomato and Pepper Mixture (Use only sound tomatoes)		Stem and wash 5 pounds of ripe tomatoes. Scald 20 seconds, about 8 at a time. Cold dip 20 seconds. Core and peel with a stainless steel knife. Wash ½ pound of fresh peppers or pimentos. Remove stems and seeds and cut into ¼ inch squares on a board. Combine tomatoes and peppers, heat with occasional stirring until they come to a rolling boil. Fill into hot containers. Add ½ tsp. salt to each pint.	Plain	30 Min.	30 Min.

.....led with spoilage, check sealing temperatures with the ones given. A dairy thermometer can be used.

TIME TABLE FOR CANNING VEGETABLES

Add 1 teaspoon dairy salt per quart of vegetables. Place jars or cans in hot canner as soon as they are filled. Process at once.

Vegetable	Temperature at center of can at time of sealing*	Preparation	Kind of Tin Can	Time of Processing			
				Pressure Cooker (Pressure 10 lbs. or 240° F.)			Boiling-Water Bath
				Pint Glass	Quart Glass	#2 Tin	Glass or Tin
Asparagus	160° F.	Use tender part of stalks only. Wash and take off scales. Cut stalks into 1 inch pieces. Cover with boiling water. Boil 3 minutes. Pack hot in hot jars. Cover with boiling cooking liquid. Exhaust tin cans 4 to 5 minutes before sealing.	Plain	Min. 25	Min. 35	Min. 20	Hours 2
Beans, Snap	160° F.	Wash, snap into inch pieces, and simmer in hot water to cover 5 minutes. Pack hot; add liquor in which cooked to cover.	Plain	20	25	25	3
Beans, Shell	160° F.	Shell, wash, and bring to boil in water to cover. Pack hot; add liquor in which cooked to cover.	C Enamel	50	55	40	3
Beets, Baby (Store if possible)		Scald or steam for about 15 minutes. Skin, leave whole. Pack hot. Cover with boiling water.	R Enamel	25	35	30	2
Carrots (Store if possible)		Scrape or peel, wash, cut as desired or leave whole. Boil 5 minutes. Pack hot. Add water in which boiled to cover. Large ones should be cut into ½ inch pieces.	Plain	20	25	20	2
Corn, Cream	200° F.	Cut corn from cob without precooking; scrape cob. Add half as much boiling water as corn by weight. This should be a sloppy mixture. Heat to boiling and pack at once.	C Enamel	85	—	105	3
Corn, Whole Grain	190° F.	Cut whole grains from cob without precooking. Do not scrape cob. Add half as much boiling water as corn by weight. This should be a sloppy mixture. Heat to boiling and pack at once.	C Enamel	55	70	60	3
Greens	160° F.	Wash thoroughly, pick out the tough stems and ribs, simmer for 5 minutes. Pack hot, loosely. Cover with boiling cooking liquid.	Plain	45	70	60	3
Peas, Green	160° F.	Shell. Pick over and wash thoroughly. Simmer in water to cover for 5 minutes. Pack hot. Cover with boiling cooking liquid.	Plain	40	—	30	3
Pumpkin and Squash, diced (Store if possible)	190° F.	Peel and cut into inch cubes, add 1 quart boiling water to 3 quarts pumpkin, bring to boil. Pack hot. Cover with water in which precooked.	R Enamel	50	60	50	3
Vegetable Soup Mixtures	190° F.	Include two or more of the following. Tomato pulp, corn, lima beans, peas, carrots, turnips, celery, onion. Bring soup mixture to boiling point and pack hot.	Plain	60	70	50	3

* If troubled with spoilage, check sealing temperatures with the ones given. A dairy thermometer can be used.

moved and used in canning another set. The screw band should not be removed from a jar of canned food until the jar is cold. Canned foods put away for storage do not need screw bands in place. Wiping screw bands with a paraffined cloth will help to prevent rusting.

When using a metal cover, examine the composition in the groove which comes in contact with the top of the jar. This composition serves the purpose of a rubber. If it is cut, do not use the cover. For this type of jar, new covers are necessary each year.

Jar Rubbers.—Use only new jar rubbers, one to a jar. Test rubbers by folding and pressing hard between thumb and forefinger. If the rubber springs quickly back into shape without retaining a crease, it is all right to use. If rubbers are considered for re-use, be sure that they meet this test and also show no impressions of contacts from previous use. Two rubber rings should never be used on a jar at once. They do not insure a perfect seal. Rubber rings should be dipped into boiling water and placed on the jars before filling them. Prepare jar caps that have a sealing composition by merely dipping them into boiling water. Precaution: With the new composition rings follow manufacturer's directions.

Rubber rings are apt to be blown out of place during processing if jars fitted with them are completely sealed.

Test Jars and Rubbers Together

Check all jars and make sure that new lids, bands, or rubber rings fit exactly—the right type rubber for the top and the correct screw band to fit jar and lid.

Put the rubber on the jar with the lip on the side opposite the wires so that the wires will not pull it over and leave a space for air and bacteria to get in and cause spoilage. Fill the jar one-third full of warm water. Put on the cover and completely seal the jar. Then turn the jar upside down on the working surface for some time. If drops of water leak out, discard that jar for the time being. Later when all such jars have been sorted out, tighten the wires and test for leaks.

The wire bail which goes over the top of the glass cover should go on with a snap, even when the lower tightening spring or clamp is up. If it does not, the bail should be removed from the tighten-

ing spring and bent against the cover so as to be straighter and consequently tighter across the top. If the bail is too tight, as sometimes happens with new jars, it may be bent away from the cover so as to be more rounding and looser. If the wire loops or ears on the sides of the jar are stretched out, tighten them with a pair of pliers. Replace wires, fill jar one-third full of water and test again. Repeat until no leak occurs or discard the jar for canning. Never use a second rubber, chip, or paper to make the seal tight.

Place jars in a shallow pan of water, mouth down. Heat and keep hot until needed. When jars are packed with food and then processed, they do not need to be sterilized first, but jars and covers should be clean and hot when the jars are filled. For open-kettle canning, however, jars and tops should be sterilized by boiling them for 15 to 20 minutes.

Filling Glass Jars or Tin Cans

When food is processed in glass jars, a head space is left above the solids to permit expansion of the food. The liquid should come within one-eighth inch of the top of the jar. Allow one-half inch of head space in all jars except for corn, peas, and shell beans; they require 1 inch head space because of greater expansion.

When filling jars or cans, obtain a reasonably tight pack of solid food without cramming and add liquid to cover—water, sirup, or broth. Liquid drives out air from the jar or can and helps to conduct heat into the solid material during processing. Foods packed without liquid require longer processing because of the slower penetration of the heat into the food. Because food expands during processing and storage, head space is needed to prevent tin cans from bulging. For most foods canned at home or in community canning centers, the following allowances are recommended, although head space varies somewhat for different products:

Volume of Contents	Size of Can	Head Space
2 cups	No. 1 cans	head space $\frac{1}{4}$ inch
2½ cups	No. 2 cans	head space $\frac{1}{4}$ to $\frac{5}{16}$ inch
4 cups	No. 3 cans	head space $\frac{3}{8}$ to $\frac{1}{2}$ inch

Exhausting, or Precooking

All fresh foods contain air within their tissues. Unless most of this air is removed before glass jars or tin cans are sealed, the food may lose flavor, and in the case of tin cans both food and cans discolor. Removing air from food and jar or can is called exhausting.

With fruits, tomatoes, asparagus, and meats, the air is often exhausted in the following way: After the raw food is packed in the glass jars or cans, place them in a bath of boiling water deep enough to come within 2 inches of their tops. Regulate the heat so as to keep the water boiling without bubbling into the food, cover the kettle to hold in the steam, and heat until the desired temperature for sealing is reached. Close the glass jars or seal the cans quickly while the food is still steaming hot and process at once.

Nonacid vegetables, such as peas, corn, beans, and pumpkins, are precooked. They are then packed boiling hot, and the glass jars or tin cans are sealed at once and processed.

Sealing Temperature

The food must be hot when the cans are sealed in order to insure a satisfactory vacuum. For tomatoes, fruits, and other foods that heat penetrates easily, the sealing temperature should be about 150° F. But for other products, such as cream-style corn, pumpkin, and squash, it should be 180° to 190° F.

Tin Cans

Tin cans may be used for canning fruits and vegetables in the boiling-water bath or in the pressure cooker.

Canning in tin requires a tin-can sealer. The advantages of using tin cans are that the cans are unbreakable; there is no loss of liquid because they are always tightly sealed before they are processed; cooling the cans quickly in cold water after processing reduces overcooking of the products; cans heat through more readily than glass; the large opening makes packing easy; cans are cheap and require less shelf space in storage than do glass jars.

The type generally used now is the sanitary, or rim-seal can. The lid has a groove around the edge where it comes in contact with the can. This groove contains a paper gasket, a coating of compound, or a rubber composition film. The paper gasket is easily

broken and must not be allowed to get wet. Paper gaskets are recommended for home canning, especially when covers are left over and used the next year. They are not impaired with age; and, because they are bulky, they more completely fill the seam. The sealing is done by crimping the cover on the can with a sealer. This involves turning a crank, and on some sealers also using a lever.

Several types of tin-can sealing machines are on the market. They generally are equipped to seal No. 2, No. 2½, and No. 3 cans. Some of the home-type machines will seal the smaller cans also. Follow the manufacturer's instructions as to the care and operation of the sealer.

Any tin-can sealer must be kept in adjustment to give perfect seals. If the sealer does not seal the can completely, the food will spoil.

Types of Tin Cans

Plain tin cans are satisfactory for most vegetables, fruits, and meats.

Enamel-lined cans are used to preserve the appearance of foods that discolor in plain tin, or to prevent darkening or corrosion of the cans. C, or dull enamel, cans are used to prevent corn and succotash from discoloring. C enamel should not be used with acid foods or with chicken or meats that contain much fat. The acid or fat may cause the enamel to peel off and make the food unsightly, although not harmful.

Sanitary, or R enamel, cans, of a deep gold color with a bright finish, are used to keep red-colored fruits and beets from fading. They are also used to prevent pumpkin and squash from corroding the can.

For rhubarb and sauerkraut, which are decidedly acid, use glass preferably. For blueberries use glass jars, R enamel, or a special enamel called blueberry enamel.

Preparing Tin Cans for Use

Wash tin cans with soap and water, rinse in clear water, and drain. Lids may be wiped with a damp cloth, but gaskets, especially paper gaskets, should be kept dry to avoid difficulties in sealing.

If tin cans are used a second time, reflanging must be care-

fully done. Otherwise a tight seal is impossible. Corroded or badly discolored cans should not be used a second time.

Cooling

After processing tin cans up to and including No. 2½ size in a pressure cooker, open the petcock on the pressure canner to let the steam escape as the pressure drops to zero. With No. 3 cans and larger sizes, allow the pressure gauge to come to zero; then open the petcock gradually. Cool tin cans at once in cold water, preferably running water, until they are lukewarm. When the cans are cool, wipe off any remaining moisture and examine for leaky seals. Leaky cans show bubbles in water while cooling.

Labels

Each jar should bear a label large enough to record what is in the jar, the date of the canning, and the method of canning used.

Before labeling, wash and polish each jar. Place the label on the plain side of the jar midway between the seams and one-half inch from the lower edge.

Tin cans may also be labeled, or the name of the contents may be written directly on the can by means of pencil eraser. Use the pencil eraser as you would a pencil or crayon.

TO CAN IN A PRESSURE SAUCEPAN

For use in home canning, a pressure saucepan must have a gauge that allows pressure to be controlled accurately at 10 pounds (240° F.). It must also be deep enough to hold jars on the rack when the cover is closed and locked in place. One quart of water is the right amount to use in the saucepan when canning.

The processing times for vegetables at 10 pounds pressure must be 20 minutes longer in a saucepan than the times recommended for a regular pressure canner. This is because the pressure saucepan heats quickly, exhausts its air content quickly, and cools rapidly after the jars of food are processed. These periods are longer in a regular pressure cooker than in a pressure saucepan and provide more of the heat that sterilizes the food for safe keeping.

Time Table for Pint Jars at 10 Pounds Pressure (240°) in a Pressure Saucepan

PRODUCTS	MINUTES
Asparagus	45
Beans, Lima	55
Beans, Snap	40
Beans, Shell	70
Beets, Baby	45
Carrots	40
Corn, creamstyle	105
Corn, whole kernel	75
Greens	65
Peas	60
Pumpkin and Winter Squash, diced	75
Squash, Summer	50

OPEN-KETTLE METHOD

The open kettle is used for cooking fruits and tomatoes to kill bacteria. This cooking takes the place of both the precooking and processing in the other methods. Water or sirup is added as required, and the food is boiled for several minutes, or until firm fruit is softened. Then sterilized jars are quickly filled, and each jar is sealed at once. The jars should be filled to the top to drive out the air.

Tin cans should not be used when canning fruits and tomatoes in an open kettle because the lids cannot be sterilized before they are sealed on the can.

To modernize the open kettle and to make sure that the tops of the jars are sterile too, place the boiling-hot jars in a boiling-hot water bath and cook them 5 to 10 minutes. Jars of fruit spoil from the top down, never from the bottom up.

OVEN CANNING

Oven canning is never recommended. Along with the danger of spoilage, there is the greater danger of an explosion.

CAUTION

The shortage of pressure cookers may make it necessary to use the boiling-water-bath method for canning non-acid foods. If this happens, special care must be taken that everything is clean, and that the boiling-hot food and liquid are packed boiling hot into hot jars and processed at once in the boiling-water bath. Before tasting or eating such products, they should be brought to a boil and boiled for at least 10 minutes after the jar or can is emptied. Any spoiled foods should be burned. Animals too die from botulism.

USE OF THE BOILING-WATER BATH

In much of the United States it is not safe to can non-acid foods with the boiling-water bath because of the danger of botulism. So far HOME-GROWN products in MAINE have not been responsible for this disease.

The Maine Extension Service recommends pressure cooker processing for all non-acid canned foods because it conserves fuel and, when properly done, prevents spoilage of both harmless and dangerous types.

However, a water bath in which the water boils for the entire period stated in the following table has given satisfactory keeping quality for fresh, home-grown Maine produce. *It should never be used for vegetables grown outside the state.*

VITAMIN C ADDED TO CANNED FRUITS TO HOLD FLAVOR AND COLOR

For years homemakers who canned pears always added slices of lemon to each jar as it was packed to help keep flavor and color. Today, to help keep the color and off-the-tree-flavor of pears, peaches, and plums, homemakers may place a tablet of Vitamin C (ascorbic acid) in the bottom of each pint jar as they fill it. The vitamin C acts against the oxygen in the air in the jar and prevents it from turning the peach, pear, or plum dark and giving them an off flavor. Each pint jar will need 125 milligrams of Vitamin C.

DRY SALTING VEGETABLES WITHOUT FERMENTATION

Vegetables like green beans, dandelions, chard, beet greens, and spinach which contain enough water to make their own brine can be preserved by adding salt enough to stop all bacterial action.

Equipment needed: Stone crock or glass jar, paring knife, pair of scales, a clean stone to weight down the salted vegetables, a clean cloth to cover, and a plate or wooden board that just fits the inside of the crock to hold the weight.

As soon as the salted vegetable settles in the crock, more can be added until the crock is full. Brine must always cover the salted product. Before using salted vegetables, they must be freshened by soaking in fresh water. This will soak out some of the vitamins and minerals. After the vegetables have been freshened, cook until tender, season, and eat.

To Salt Beans and Greens

1. Wash the beans or greens thoroughly. Lift them out of wash waters. These vegetables grow close to the ground and are sometimes hard to get clean. After a wash in cold water, a wash in warm water will help in the cleaning. Remove any dead leaves and woody stalks.
2. Tip the beans, cut them as for serving.
3. Weigh the vegetables.
4. Weigh out one fourth as much salt as vegetable. Dairy or butter salt is recommended.
5. (a) *Greens*.—Mix the greens and salt in the crock. Do not bruise or crush.
(b) *Beans*.—Fill the crock—a layer of salt and a layer of beans.
6. Cover with a clean cloth.
7. Place a plate that just fits inside of the crock to hold the weight.
8. Weight down with a clean stone or a jar of water.
9. When the vegetable has settled, more can be added until crock is full.
10. Allow crocks to stand in a cool, dark place (cellar).

11. Brine must cover the vegetable at all times. If needed, add brine (1 cup salt to 1 quart of water).
12. If mold forms, remove it.
13. They are ready to use at any time.

To Salt Corn

1. Husk and remove silk.
2. Cook in boiling water 10 minutes to set the milk.
3. Cut corn from cob with a sharp knife.
4. Weigh.
5. Weigh out one fourth as much salt as vegetable. Dairy or butter salt is recommended.
6. Pack in crock—first a layer of salt and then a layer of corn.
7. Cover with cloth and plate; weight down.
8. Treat and use the same as other vegetables.

DRY SALTING VEGETABLES WITH FERMENTATION

While turnips, beets, beans, and greens may be preserved by this method, cabbage is the one most used. Sauerkraut is the product.

Sauerkraut is a fermented cabbage pickle. Add about one pound of bag or dairy salt to 40 to 50 pounds of cabbage.

The most food value is obtained by eating both kraut and juice. Drink the juice by itself or combine it with other vegetable juices. Kraut does not need to be freshened.

Equipment needed: Clean stone crocks or clean casks of cypress or white pine, cabbage, bag salt, clean sharp knife, pair of scales, cutter, wood cover which just fits, wooden potato masher, clean cloth to cover, and weight to weight down the kraut.

Sauerkraut

Sauerkraut can be made from heads of cabbage which cannot be stored. Allow heads to stand a few days.

1. Make sure that the cabbage is clean.
2. Remove the cores.
3. Weigh the cabbage.

4. Cut the cabbage into long shreds. A slaw cutter or a sharp knife and cutting board may be used in shredding.
5. Weigh out the dairy salt—1 pound of salt to 40 or 50 pounds of cabbage.
6. Mix well either before putting in the crock or barrel or after the kraut is in the barrel or crock.
7. Tamp down with a wooden weight until the cabbage looks juicy.
8. Add mixtures of salt and cabbage until the top of the crock or barrel is reached.
9. Leave space at the top for the bubbles made by the fermenting cabbage.
10. Cover with clean plate or with a wooden plate that just fits inside the crock.
11. Cover with loose, clean cabbage leaves or clean cheesecloth.
12. Weight down with a clean weight.
13. Store at 70° to 75° F. if the kraut is needed in a few weeks, or at 55° F. if a period of 6 weeks can pass before it is needed for food.
14. Remove the scum that forms every few days; otherwise the kraut will not be good.

The kraut is ready to use when bubbles stop coming up and the kraut looks honey colored and transparent. It can be left in the crock as is, covered with paraffin, or packed into jars, or canned.

The top leaves and any softened kraut at the top of the crock or keg must be thrown away. When taking out kraut to use, be sure to leave enough liquid to cover that which is left.

Quick Kraut

Many people like quick kraut because it is easily made and has a mild flavor.

1. Prepare shredded cabbage as for sauerkraut.
2. Mix 7 tablespoons bag or dairy salt with 10 pounds of cabbage.
3. Pack into pint-size glass jars with glass tops and partially seal.
4. Store jars for about 5 days at 70° F. Enough juice ought to have been formed by then to cover the kraut.
5. Completely seal the jars and store.
6. Quick kraut is ready to use at the end of 6 weeks. Use in the same way as sauerkraut.

HOME DRYING

The aim in drying any food is to remove enough moisture to insure keeping and to preserve food values with as much natural flavor and cooking quality as possible.

The quality of dried fruits and vegetables depends upon the quality of the fruits and vegetables used. One bad piece may spoil the whole batch. Some pieces will not dry.

Home drying may be a combination method of "over the stove" and "in the sun," or each method may be used separately.

The fruit or vegetable to be dried must be thoroughly cleaned, sliced, spread out in trays, and covered with cheesecloth or wire netting to keep out dust and insects.

Before placing them directly in the rays of the sun, the fruits and vegetables to be dried should be placed over a warm stove, in a warm oven, in a good stiff breeze, or in the shade to give the moisture on the inside of the slices a chance to get out. If the outside dries hard before the moisture inside is removed, the dried pieces are apt to mold. Turn the pieces and combine trayfuls as they dry.

General Directions for Drying

1. Have produce about the same stage of ripeness.
2. Have all equipment clean.
3. Work quickly and cut pieces about the same size.
4. Blanch or steam fruit or vegetables to keep color and flavor. Steam or dip in boiling water from 5 to 8 minutes. This is optional.
5. Drain, dry, and spread on trays to dry.
6. Put trays in oven with door open or put trays into frame hung above the stove (any heat).
7. Watch carefully so that the oven doesn't get too hot. The proper temperature for fruits is from 130° to 175° F.; for vegetables, from 110° to 150° F.
8. Dry until the product is leathery, springy, hard, or brittle. When part of the product dries before the rest, remove the thoroughly dried part. Allow the rest to finish drying.
9. Allow product to stand in open container, covered with a cloth, for from 24 to 48 hours. If too much sweating occurs, the food has not been dried enough. Redry if necessary.

10. When thoroughly dry after standing from 24 to 48 hours, place the product in deep jars or bags and allow them to stand for 8 to 10 days, stirring the product daily. This is called conditioning. If still too moist, return to drier.
11. Before final storing, heat for 30 minutes at a temperature of 150° to 180° F. to protect food from moth or weevil eggs.
12. Pack in air-tight containers—store in a dry, cool, dark place. Sliced vegetables should dry in one day—transparent hard, and brittle. Sliced fruit, in two days—leathery.

Apples.—Peel, core, and slice into thin slices or rings ($\frac{1}{8}$ " to $\frac{1}{4}$ " thick). To prevent discoloration, place slices in a salt solution (3 tablespoons salt to each gallon of water) for 5 minutes. Steam and spread on trays and dry as recommended. Or raw pieces of apples may be strung on string with a large darning needle ~~and~~ hung up to dry. When the pieces are dried they can be slipped off the string and stored. Yield: 8 pounds of fresh apple will give about one pound of dried apple.

Blueberries.—Wash and dry carefully. Fill into trays in thin layers. Do not turn while berries are soft and mushy. Dry at around 150° F. Berries are dry when they rattle on trays and show no moisture when crushed.

Beans.—Allow beans to mature on the vines, gather, dry, and shell them. When they are thoroughly dry, store them in insect- and rodent-proof containers.

Corn.—Take ears with well-formed kernels. Dip in boiling water about 10 minutes until the milk is "set" (no liquid runs out when the kernel is cut). Cut the kernels from the cob with a sharp knife. Spread thin on trays and dry as recommended. Corn should be stirred regularly in order to dry thoroughly. Dried corn is hard and clear in appearance.

Peas.—As for beans.

Green Peas.—Gather as for table use. Shell and dip two minutes in boiling salt water (2 tablespoons per gallon). Drain, spread on trays one-half to three-fourths inch thick, and dry at 115° F. at start, increasing to 140° F. Stir frequently while drying. Dry until brittle.

Spinach and Other Greens.—Wash well. Discard any tough stems. Steam the leaves 2 to 6 minutes. Put on cloth in a tray. Dry as quickly as possible at not more than 150° F.

Celery Leaves, Celериac, Parsley, and Herbs.—Wash thoroughly. Spread on trays in the shade or in a cool, airy room. Stir often. Or tie the herbs in small bunches and hang up to dry in a well-ventilated room as quickly as possible. The leaves will break away from the stems. Store the leaves in glass containers with a well-fitting top. The stems can also be stored in paper bags or broken up and stored in glass jars.

Preparing Dried Food for Table Use

Wash, then soak the dried food overnight in lukewarm water. The next morning cook the product in the water in which it has soaked. Simmer, but do not boil, until tender. If all the water is absorbed during the overnight soaking, add just enough water in the morning to cook the food. Prepare as desired for serving.

JELLY

A fruit jelly is a semisolid mass which holds its shape when turned out onto a plate but quivers when the plate is moved. It should have the color and the delicate flavor characteristic of the fruit from which it is made. Usually it is translucent. Jelly should be so tender that it cuts easily, yet breaks with a sharp cleavage line and shows clean-cut faces.

Preparing the Fruit

After selecting a mixture of ripe and slightly underripe fruit, prepare it in small lots at a time so that the jelly process may be carried through promptly. With berries, 6 quarts is a good quantity; with such fruits as apples or grapes, 8 pounds. Two pounds of prepared fruit yield approximately a pint of juice. And a pint of fruit juice made up with an equal quantity of sugar yields about 1½ pints of jelly.

Look over the fruit and discard any damaged parts. Wash thoroughly, using a brush for hard fruits, such as crab apples, quinces, and apples. If they show spots of spray residue they should be peeled, since washing with water may not completely remove poisonous spray materials that have dried on fruits. Discard the stems and the blossom ends of apples, crab apples, and

quinces. This is particularly important in sprayed apples, as the spray residue concentrates at these points. Cut the fruit into small, uniform pieces, but do not remove the cores, as these contain considerable pectin.

Wash berries quickly and carefully, to prevent loss of juice. Lift the fruit out of the water instead of pouring the water off, as most of the dirt settles to the bottom of the container. Drain. Remove the caps and the stems of berries. Leave the stems on currants, the skins on grapes, plums, quinces, and apples, with the exception noted above.

Extracting the Juice

Boiling the fruit is necessary to extract the pectin in the juice. With normally juicy fruits no more than the minimum of water indicated in the table below should be added. Any excess of water must be boiled away, and prolonged boiling tends to destroy pectin, flavor, and color. Nevertheless, if the fruit lacks normal juiciness, as when grown under drought conditions, the proportion of water may need to be doubled and the time of boiling increased so as to soften the fruit.

Boil the fruit in a broad, flat-bottomed kettle, and stir frequently to prevent scorching. Crush soft fruits to start the flow of juice. Count time only after the fruit begins to boil. Berries, currants, and grapes need 5 to 10 minutes to cook soft, and apples and quinces 20 to 25 minutes. The time varies with the firmness of the fruit.

Pour the hot cooked fruit at once into a jelly bag. Let the fruit drip. When the dripping has almost stopped, press the jelly bag to get out all the juice. Clarify the juice by re-straining through a fresh jelly bag wrung from hot water.

Some fruits, such as currants, crab apples, and wild grapes, are so rich in pectin and acid that two extractions of juice can be made from the same lot of fruit. Second-extraction juices may then be combined or made into jelly separately.

Proportions of Water to Fruit, and of Sugar to Fruit Juice in Making Jellies

Kind of fruit	Quantity of water to each pound of prepared fruit (for extraction of juice)	Time of boiling fruit to extract juice	Quantity of sugar to each cup of fruit juice
	Cup	Minutes	Cup
Apples	1	20 to 25	$\frac{3}{4}$
Crab apples	1	20 to 25	1
Blackberries and Black raspberries	} Firm fruit, $\frac{1}{4}$ } Very soft fruit, none	5 to 10	$\frac{3}{4}$ to 1
Cranberries		5 to 10	1
Currants	$\frac{3}{4}$ or none	5 to 10	$\frac{3}{4}$
Gooseberries	$\frac{1}{4}$	5 to 10	1
Grapes such as Concord	$\frac{1}{4}$ or none	5 to 10	$\frac{3}{4}$ to 1
Grapes, wild	1	5 to 10	1
Plums, Wild Goose type	$\frac{1}{2}$	15 to 20	$\frac{3}{4}$
Quinces	2	20 to 25	$\frac{3}{4}$
Red raspberries	None	5 to 10	1

Complete directions for making jellies, jams, and preserves are found in Farmers' Bulletin, No. 1800, from which the above information was taken. It may be obtained free from Superintendent of Documents, Government Printing Office, Washington, D. C., or by writing to the Extension Service, University of Maine.

EXAMINE CANNED FOODS BEFORE USING

All food, including canned food, should be inspected before being used. If there is any sign of spoilage, food should be discarded, and nonacid vegetables and meats should be burned.

Tin cans should not bulge at either end, and seams of cans should show no evidence of leaks.

In glass there should be no bulging of rubbers or signs of leakage. When container is opened, there should be no spurting of liquid or sudden outburst of air.

The odor should be characteristic of the product.

Never taste food to see if it is spoiled.

Nonacid foods canned by any method except with the pressure cooker should be boiled for 10 minutes before they are tasted. This precaution would usually insure safety even if the toxin of *Cl. botulinus* were present. This toxin has not been a hazard in Maine-grown produce.