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Homemade Pickles and Relishes  
Michigan State University Extension Service  
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Reprinted August 1938  
12 pages

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MICHIGAN STATE COLLEGE

EXTENSION DIVISION

R. J. Baldwin, Director

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**HOMEMADE PICKLES AND RELISHES**

ROBERTA HERSHEY

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While pickles have no outstanding nutritive value, they do add interest and zest to the menu. However, it is important to remember that pickles should never be substituted for fresh or canned vegetables but should be served as an appetizer.

**PICKLE MAKING SUPPLIES**

Choose fresh, high quality products for pickling and sort for size and stage of ripeness. Cucumbers should not be bruised and should retain about one-eighth inch of their stems. All products should be thoroughly washed.

Fresh cider vinegar is preferred for pickling or colorless distilled vinegar may be used. The latter is better for pickling onions.

Granulated sugar is usually used in pickle making, but a small amount of brown sugar gives richness.

Care must be taken that too much spice is not used since the flavor continues to come out of the spice as the pickles stand. Cloves, cinnamon, celery seed, pepper, caraway, mustard, allspice, bay leaves, mace, tumeric, and dill are common pickle spices. Mixed whole spices especially prepared for pickling are quite satisfactory. Spices may cause cloudiness of the vinegar so, for best results, the spice mixture should be tied in a cheese cloth bag, simmered in the vinegar for not more than half an hour, and then removed.

Soft water should be used for making the brine. The presence of calcium and other salts may prevent acid formation and interfere with the curing process. The addition of a small quantity of vinegar is recommended if hard water must be used.

**LONG PROCESS PICKLES**

A six to twelve week brining process greatly improves the color, flavor and crispness of pickles as well as resulting in better keeping quality. This brining process is the secret of successful commercial pickle making. String beans, green tomatoes, and corn on the cob may be preserved for several months by this method.

### Steps in Brining Process:

1. Weigh washed cucumbers and place in a large glass or stone jar.
2. Cover with a 10% brine. (Use 1 lb. salt to 9 pints water.)
3. Next day add one pound salt to each ten pounds of cucumbers. This is necessary to maintain the strength of the brine.
4. Cover with a board or plate that will go inside the jar and add a weight sufficient to keep cucumbers well below the surface.
5. At the end of the first week, add one fourth pound of salt. Repeat this addition of salt for four more weeks. Place the salt on the cover, otherwise the brine in the bottom of the jar will be stronger than that on top.
6. Skim off any scum that forms since it will destroy the acidity of the brine.
7. To remove excess salt before pickling, cover the pickles with water, heat slowly to 120° F. (a little warmer than lukewarm) and keep at that temperature for ten hours, stirring frequently. Pour off the water and repeat until the pickles taste only slightly salty.
8. The pickles may be eaten as salted pickles or may be made into other varieties.

### Sour Pickles

(Using long-brined cucumbers)

Drain the pickles and cover with vinegar. The pickles will keep indefinitely if the vinegar is renewed after a few weeks.

### Sweet Pickles

(Using long-brined cucumbers)

Cover the cured pickles with vinegar. After one week discard vinegar, pack pickles in jars and cover with a sweetened spiced vinegar. Allow one ounce of whole mixed spices for each four gallons of pickles, heat in the vinegar for half an hour, remove spices, and then add four pounds of sugar to each gallon of vinegar. If a sweeter pickle is required, gradually add sugar later since adding the entire amount at first may cause shriveling.

### Sweet Mixed Pickles

(Using long-brined vegetables)

1 quart sliced cucumbers	1 pint cauliflower, cut in sections
1 pint sliced onions	1 pint sliced green tomatoes
1 pint snap beans, cut	1 pint sliced green peppers
½ pint sliced sweet red peppers	

Freshen the vegetables by the method described in No. 7 above, chop them, and drain off all the liquid. Pour over them a pickling mixture made as follows:

3 cups vinegar	1 tablespoon mustard seed
1 cup water	2 hot red peppers
1½ cups sugar	1 tablespoon mixed pickle spice
1 tablespoon celery seed	

Mix and bring to the boiling point and pour while boiling hot over the vegetables. Seal the pickles in sterilized, airtight jars, and store in a cool place.

### Dill Pickles

Place in the bottom of a large stone jar a layer of dill and one-half ounce of mixed spice. Then fill the jar, to within two or three inches of the top, with washed cucumbers of as nearly the same size as practicable. Add another half ounce of spice and layer of dill. It is a good plan to place over the top a layer of grape leaves. In fact, it would be well to place these at both the bottom and top. They make a very suitable covering and have a greening effect on the pickles.

Pour over the pickles a brine made as follows: Salt, one pound; vinegar, one pint; water, 2 gallons. Never use a hot brine at the beginning of a fermentation, since it might kill the organisms present, thus preventing fermentation.

Cover with a board cover or plate with sufficient weight on top to hold the cucumbers well below the brine.

If the cucumbers are packed at a temperature around 86° F., an active fermentation will at once set in. This should be completed in 10 days to two weeks, if a temperature of about 86° F. is maintained. The scum which soon forms on the surface and which consists usually of wild yeasts, but often contains molds and bacteria, should be skimmed off.

After active fermentation has stopped, it is necessary to protect the pickles against spoilage. This may be done in one of two ways:

(1) Cover with a layer of paraffin. This should be poured while hot over the surface of the brine or as much of it as is exposed around the edges of the board cover. When cooled this forms a solid coating which effectually seals the pickles.

(2) Seal the pickles in glass jars. As soon as they are sufficiently cured, which may be determined by their agreeable flavor and dark green color, transfer them to glass jars, and fill either with their own brine or with a fresh brine made as directed. Add a small quantity of dill and spice. Bring the brine to a boil, and, after cooling to about 160° F., pour it over the pickles filling the jars full. Seal the jars tightly and store in a cool place.

The plan of preserving dill pickles by sealing in jars has the merit of permitting the use of a small quantity without the necessity of opening and resealing a large bulk, as in the case when pickles are packed in large containers and sealed with paraffin.

### Chow Chow

(Using long-brined vegetables)

1 pint sliced onions	1 pint cider vinegar
1 pint cauliflower, cut in sections	1 cup sugar
1 quart cut snap beans	4 teaspoons mustard seed
12 green peppers	5 teaspoons celery seed
1 red pepper	6 teaspoons grated horseradish

After the vegetables are freshened in the usual way, mix and chop them, and drain off all liquid. Heat the vinegar, sugar, and spices to the boiling point and pour over the vegetables. Stir and let stand overnight. In the morning stir well, pack in sterilized jars, seal, and store in a cool place. This amount yields three quarts of chow chow.

### Mustard Pickles

(Using long-brined vegetables)

2 quarts sliced cucumbers	1 quart onions, quartered
1 quart snap beans, cut in $\frac{1}{2}$ inch pieces	1 quart cauliflower, cut in sections
1 quart sliced green peppers	1 cup sliced sweet red peppers

Freshen the brined vegetables in the usual way to remove the excess salt, and pour over them the following mixture:

1½ cups sugar	1 tablespoon tumeric
1½ cups flour	2 quarts vinegar
$\frac{2}{3}$ cup ground mustard	

Mix the dry ingredients with enough vinegar to make a smooth paste. Heat the rest of the vinegar, add to the mixture, and cook until it thickens, and pour hot over the vegetables. Let stand overnight. Then pack the pickles in sterilized jars, seal, and store in a cool place. This amount makes about five quarts of pickle.

### SHORT PROCESS PICKLES

#### \*Quick Cucumber Pickle

The fermented pickle is undoubtedly the best but an edible pickle may be made in the following way.

Place the clean fresh cucumbers in a crock and cover with a salt brine made by dissolving four ounces, or about one-half cup, of salt in a quart of warm water. A weight will have to be used to hold the cucumbers under the brine. Let stand overnight. Make a vinegar solution, using six ounces of sugar and one and one-fourth ounce whole mixed spices (tied in a cloth bag) to each quart of good vinegar and simmer for about five minutes. Let stand overnight.

In the morning pour off brine and rinse cucumbers in clean cold water, putting them into an agate pan. Cover with the pickling solution, if vinegar is strong enough of spice remove spice bag, and allow to stand at least 24 hours (2 to 3 days would be better).

Pack cucumbers into jars and cover with a fresh, boiling-hot solution made in the same manner as above.

Adjust cover and rubber and process in hot water bath for five minutes.

Label and store in a cool, dry place.

A four-gallon crock will hold 12 lbs. ( $\frac{1}{4}$  bu.) cucumbers. A pint of brine or pickling solution is required for each pound of cucumbers.

Spices and sugar may be varied to suit taste.

\*Chenoweth and Cole, Mass. State College.

**\*Mustard Pickle**

(Quick method)

- |                        |                                  |
|------------------------|----------------------------------|
| 1 small cauliflower    | 4 tablespoons flour              |
| 1 doz. small cucumbers | 1 cup brown sugar                |
| 1 lb. pickling onions  | 3 tablespoons grated mustard     |
| ½ lb. cut string beans | ½ tablespoon tumeric             |
| 1 red pepper (sweet)   | 1 tablespoon crushed celery seed |
| 1 green pepper (sweet) | 1 cup salt                       |
| 2 quarts vinegar       |                                  |
1. Wash and cut up all vegetables into chunks.
  2. Place in brine (1 cup salt and 1 gallon water), leave for 24 hours.
  3. At end of this period freshen for two hours in cold water. Drain thoroughly.
  4. Make liquor of one quart vinegar and one quart of water. Let vegetables stand in it 30 minutes.
  5. Bring to boil in this liquor.
  6. Make dressing by mixing and cooking to a smooth paste one quart vinegar and flour, sugar, and spices.
  7. Drain vegetables and pour on dressing.
  8. Mix well and pack into jars.
  9. Partly seal and process for five minutes.
  10. Completely seal, cool and store.

**Cucumber and Onion Rings**

- |                             |                           |
|-----------------------------|---------------------------|
| 1 peck small cucumbers      | 1 cup mustard seed        |
| 2 quarts small white onions | 2 tablespoons celery seed |
| 1 cup salt                  | 2 tablespoons peppercorns |
| Vinegar                     |                           |

Slice the cucumbers and onions about one-fourth inch thick, pack in a crock in layers with the salt sprinkled between, and let stand overnight. In the morning drain in a cheesecloth bag, and press out all the juice possible. Taste before adding the vinegar and if too salty rinse in cold water. Measure the onions and cucumbers, take half as much vinegar, heat to the boiling point, add the spices, and pour over the vegetables. Pack at once in sterilized glass jars, seal, and store in a cool place.

**Bread and Butter Pickles**

Sprinkle with salt and let stand over night:

- 12 large cucumbers sliced
- 4 large onions sliced
- 2 stalks celery cut in pieces

Drain in the morning and add:

- |  |                                   |
|--|-----------------------------------|
| 3 cups vinegar                           | ½ teaspoon ginger                 |
| 2 cups sugar (brown sugar<br>if desired) | ½ teaspoon tumeric powder         |
| 1 teaspoon mustard seed                  | Small amount celery seed          |
|  | 2 red or 2 green peppers, chopped |

Cook about one-half hour or until done. Seal while hot.

\*Chenoweth and Cole, Mass. State College.

### Pickled Onions

4 quarts small white onions	$\frac{1}{2}$ cup sugar
1 quart white vinegar	2 tablespoons whole pickling spice
1 pint water	2 teaspoons salt

Dip the onions in boiling water and let stand two to three minutes. Cool immediately in water. Cut a thin slice from the root end of the onions and slip off the skin. Mix the vinegar, water, sugar, spice, and salt, and heat to the boiling point. Pour over the onions which have been packed in sterilized jars. Partially seal the jars and process in a boiling water bath for 30 minutes. Seal and store.

### Olive Oil Pickles

50 medium sized cucumbers sliced very thin	1 tablespoon ground white pepper
3 small white onions sliced very thin	4 tablespoons white mustard seed
2 tablespoons celery seed	$1\frac{1}{2}$ cups olive oil

Soak cucumbers in strong salt water three hours and drain. Add rest of ingredients. Mix well, add vinegar to cover. Put into jars without heating.

### Sliced Sweet Pickles

Slice cucumbers crosswise in one-fourth inch slices. Sprinkle with salt. Pour boiling water over them. Let cool and drain.

2 cups sugar	1 teaspoon celery seed
1 quart vinegar	3 drops cinnamon oil
1 cup water	3 drops clove oil
1 teaspoon mustard seed	

Boil the above ingredients 10 minutes. Drop in cucumbers and bring to boiling point. Pour in clean hot jars and seal.

### Pickled Beets

Baby beets, cooked	1 stick cinnamon
$\frac{1}{4}$ cup sugar	$1\frac{1}{2}$ teaspoons salt
1 tablespoon cloves	2 cups vinegar

Boil sugar, seasoning, vinegar, and spices five minutes. Pour over beets which have been packed in clean hot jars. Seal.

### Pickled Carrots

Carrots	Mustard
Sugar	Vinegar
Salt	

Clean and scrape carrots and cook in boiling salted water till just tender. Prepare a vinegar solution using the proportion of one cup salt, one cup sugar and one cup mustard to one gallon of vinegar. Bring solution to boiling point. Pour over carrots which have been packed in clean hot jars.

**Dilled Green Tomatoes**

40 to 50 green tomatoes	1 pound salt
2 ounces mixed pickle spices	4 tablespoons sugar
Fresh or dried dill	2 gallons water
1 pint vinegar	

Use fresh-picked green tomatoes of uniform size and free from blemish. Wash them well and drain. Into a five-gallon crock place a layer of dill and spice. Fill the jar with the tomatoes to within four or five inches of the top. Mix the vinegar, salt, sugar, and water, and pour over the vegetable. Place a layer of dill over the top. Cover with a heavy plate and weight it down to hold the vegetable under the brine. Use only enough brine barely to cover, for as the liquid is drawn from the vegetable the jar may overflow. Each day remove the scum that forms over the top and keep the pickles at even room temperature, about 70° or as warm as 86° F. if possible. In about two weeks the pickles are ready to use—crisp, well-flavored with dill, and clear throughout with no white spots when cut.

For storage, pack the cured pickles in sterilized quart glass jars, and add one-half cup of vinegar to each. Fill up the jars with the pickle brine, but first strain it, bring it to the boil, and cool. Seal the jars airtight and store in a cool dry place.

**PICKLED FRUITS**

Pickled fruits are much like preserves and should be cooked no longer than necessary, or the texture and flavor are impaired. With some fruits it is best to let them stand overnight in the sweet-sour sirup after the first cooking, then drain the sirup from the fruit and boil it down separately, and pour again over the fruit, repeating as often as necessary. This way the sugar has a chance to draw out the fruit juices, while the fruit slowly absorbs the spicy sirup without shriveling or breaking up.

**Pickled Peaches**

8 pounds peaches	8 two-inch pieces stick cinnamon
4 pounds sugar	Cloves
2 quarts vinegar	

Select firm white peaches preferably clingstones. Wash them well, remove the thin skin with a sharp knife, and stick two cloves into each peach. Cook the vinegar, cinnamon and sugar together for 10 minutes, or until the sirup is fairly thick. Add the peaches, cook them gently until tender, but not broken, and let stand in the sirup overnight. In the morning drain the sirup from the peaches and pack the fruit into sterilized jars. Boil the sirup rapidly until thick and pour over the peaches in the jars. Seal, label, and store in a cool place. Allow the pickled peaches to stand several weeks to develop flavor before serving.

**Pickled Pears and Crabapples**

8 pounds prepared fruit	10 two-inch pieces stick cinnamon
4 pounds sugar	2 tablespoons whole cloves
1 quart vinegar	2 tablespoons whole allspice, more spice if desired
1 pint water	

**Seckel Pears**—Wash the pears, leave on the stems and scrape off the blossom ends. Boil the pears for 10 minutes in water to cover, and pour off the water. Prick the skins of the pears. Boil for five minutes the vinegar, water, sugar, and spices tied loosely in cheesecloth. Add the pears and boil for 10 minutes or until they are tender. Allow the fruit to stand in the sirup overnight. Drain, remove the spice bag and pack the pears in sterilized jars. Bring the sirup to the boiling temperature, pour over the fruit, seal, and store in a cool place.

**Kiefer Pears**—Wash the pears, pare, cut in half or quarter, and core. Boil the pears for 10 minutes in water to cover. Use one pint of this water to dilute the vinegar for the sirup. Finish in the same way as Seckel pears.

**Crabapples**—Follow the directions for Seckel pears, except omit cooking in the water and pricking the skin of the fruit.

### Pickled Cherries

9 pounds pitted sour red cherries	Vinegar
7 pounds sugar	10 two-inch pieces stick cinnamon
1 tablespoon whole cloves	(more or less as desired)

Sprinkle the sugar over the pitted cherries and let stand overnight. In the morning, stir until the sugar is dissolved and then press the juice from the cherries. Tie the spices loosely in a cheesecloth bag, drop this into the juice, and boil it down until it is about three-fourths of the original quantity. Remove the spice bag. Fill sterilized jars with the drained cherries and pour the hot sirup over them. Add two tablespoons of vinegar to each pint. Seal and let stand for about two weeks to blend before using.

### Watermelon Pickle

4 pounds watermelon rind	1 pint water
Limewater made with 2 quarts cold water and 10 grams, or 2 table- spoons lime	1½ pounds granulated sugar
2 quarts vinegar	2 tablespoons whole allspice
	2 tablespoons whole cloves
	10 two-inch pieces stick cinnamon

Select rind from a firm, not overripe melon, and before weighing trim off green skin and pink flesh. Cut in inch cubes and soak for two and one-half hours in the limewater. Drain, cover with fresh water and cook for one and one-half hours, or until tender, and add more water as it boils off. Let stand overnight in this same water, and next morning drain. Bring to the boiling point the vinegar, one pint of water, the sugar, and the spices tied loosely in cheesecloth. Add the drained watermelon, and boil gently for two hours, or until the sirup is fairly thick. Remove the spice bag, pack the watermelon pickle in sterilized glass jars, seal airtight, and store in a cool place.

### Cherry Olives

Place Royal Anne cherries in pint jars and pour over them one-half table-spoon salt and one-eighth cup white vinegar to each pint. Fill jars with cold water. Seal.

**RELISHES****Catsup**

10 pounds red ripe tomatoes	1 teaspoon ground mustard
3 onions	1 teaspoon celery seed
2 sweet red peppers	1 tablespoon salt
1 cup vinegar	1 teaspoon whole allspice
$\frac{3}{4}$ cup sugar	1 teaspoon whole cloves
2 teaspoons paprika	3 two-inch pieces stick cinnamon

Wash the vegetables, slice, and remove the seeds from the peppers. Cook the vegetables for about 30 minutes, then press through a fine sieve. Boil the pulp rapidly for about 30 minutes, or until somewhat thickened. Add the remaining ingredients after tying the allspice, cloves, and cinnamon in a piece of cheesecloth. Boil the mixture until thickened and stir frequently. Fill sterilized bottles with the catsup, use new cork stoppers, and dip the bottle tops into sealing wax or melted paraffin to make an airtight seal. Store in a dark cool place. This quantity of tomatoes will yield from one to two quarts of catsup.

**Chili Sauce**

5 quarts skinned chopped ripe tomatoes	1 cup sugar
2 cups chopped sweet red pepper	3 cups vinegar
2 cups chopped green pepper	1 teaspoon ground cloves
$1\frac{1}{2}$ -cups chopped onions	1 teaspoon ground allspice
3 tablespoons salt	1 teaspoon ground cinnamon

Combine the chopped vegetables, salt, and sugar, and simmer until the mixture begins to thicken. Then add the vinegar and spices and cook the mixture down until it becomes a thick sauce. Pour it into hot sterilized bottles, use new cork stoppers and dip the bottle tops into sealing wax, or melted paraffin. Store in a dark cool place. This recipe yields about three quarts of sauce.

**Dixie Relish**

1 pint chopped sweet red peppers	1 cup sugar
1 pint chopped sweet green peppers	4 tablespoons salt
2 tablespoons mustard seed	1 quart vinegar
1 tablespoon celery seed	1 quart chopped cabbage
	1 pint chopped white onions

Cut the peppers into quarters, discard the seeds and coarse white sections and soak overnight in a brine made of one cup of salt to one gallon of water. Freshen for an hour or two, then drain and chop; then heat the spices with the sugar, salt, and vinegar to the boiling point, then pour over the mixed vegetables. Pack the relish in hot sterilized jars, partially seal, and process for 15 minutes at simmering temperature (185° F.). Seal airtight and store in a cool place.

### Apple Chutney

3 quarts sliced apples	2 pounds raisins
3 lemons, sliced and seeded	1 tablespoon ground ginger
2 chili peppers, with seeds removed	1 teaspoon paprika
1 quart brown sugar	1 teaspoon salt
1 quart cider vinegar	1 onion, chopped
1 quart dates, stoned and chopped	2 cloves garlic
1 pint tarragon vinegar	

Chop the apples with the lemons as the acid will help to keep the apples from turning dark. Mix all the ingredients. Boil gently until the apples are soft and stir the mixture occasionally with a fork. Pack while hot in sterilized jars, seal, and store in a cool place.

### Beet and Carrot Relish

Mix together: one pint of chopped cabbage, one pint of cooked chopped beets, one pint of chopped raw carrots, one-half cup of grated horseradish, one and one-half cup sugar, two tablespoons salt, and one teaspoon paprika. Cover with vinegar. Bring to boiling point and seal in hot, clean jars.

### Corn Relish

Eighteen large ears of corn, cut from ear. One head cabbage, four large onions, three red peppers. Chop all together, mix with corn and add one and one-fourth pounds of light brown sugar, one-fourth cup salt, three tablespoons of prepared mustard, three pints of vinegar. Mix and boil 15 minutes. Fills eight glass jars.

### Piccalilli

12 pounds green tomatoes	1½ pounds sliced onions (if desired)
3 green peppers	
Allspice	2 hot peppers

Slice vegetables or chop coarsely. Sprinkle with one pint of salt, cover with water and allow to soak over night. Drain thoroughly and cook slowly in the following mixture till tender:

3 quarts vinegar	1 teaspoon ground cinnamon
4 cups sugar	2 tablespoons ground mustard, or mustard seeds
1 teaspoon ground ginger	

Add one cup grated horseradish. Pack in clean hot jars and seal. Allspice and cloves may be used if desired.

### Indian Relish

6 quarts green potatoes	2 quarts onions, chopped
4 red peppers, chopped	3 green peppers, chopped

Sprinkle with one-half cup salt and allow to stand over night. Drain off juice the following day and bring to boil in weak vinegar solution ( $\frac{1}{4}$  cup vinegar to 1 cup water). Drain off liquid from vegetables. Mix following ingredients and bring to a boil:

6 cups sugar	2 tablespoons white mustard seed
1½ tablespoons cinnamon	2 quarts vinegar
1½ teaspoons cloves	

Add chopped ingredients and boil three-fourths hour. Seal.

#### Uncooked Relish

3 cups ground cabbage	1 cup ground pickles
¾ cup ground onions	1 pimento
1 cup sugar	

Add weakened vinegar to moisten and salt to taste.

#### Horseradish

1 cup grated horseradish	½ teaspoon salt
1 cup cold vinegar (white vinegar preferred)	

To the grated horseradish add the salt and vinegar. Mix well and seal in clean, cold jars.

### SAUERKRAUT

Almost any variety of cabbage may be used for making sauerkraut but the slow growing and solid-headed varieties are preferable. The cabbage should be fully matured before it is cut, otherwise the product will show defects in color and texture.

Stone jars make the best containers for the making of sauerkraut in the home. After the cabbage is shredded, it is placed in the jars alternately with the salt in the proportion of one pound of salt to every 40 pounds of cabbage. Common failures in making sauerkraut are the use of too much salt, and an uneven distribution of salt. The red streaks sometimes seen in sauerkraut are thought to be due to uneven salt distribution. The cabbage should be packed firmly in the jar, covered with a clean cloth and a board or plate on which is placed a weight heavy enough to cause the brine to come up to the cover.

The jar should be kept at a temperature of about 86° F. so that fermentation can take place, a process which requires about 10 days. The scum should be skimmed off as it forms, since it tends to destroy the acidity.

If it can be stored in a cool place it may not be necessary to do more than keep the surface skimmed and protected from insects. Otherwise, the jars should be sealed by pouring a layer of hot paraffin over the surface. Another way of keeping the sauerkraut is to pack it in glass jars and add enough of the brine to completely fill the jars. Sauerkraut will keep in a good condition a year or more if before sealing it is heated in a water bath until the temperature of the center of the jar is about 160° F. and is then stored in a cool place

## OVERCOMING COMMON DIFFICULTIES IN PICKLE MAKING

**Hollow Pickles**—This may happen during curing or it may be due to faulty development of the cucumbers. It may be caused by allowing the cucumbers to stand too long a time before brining. They should not stand more than 24 hours.

**Lack of Crispness**—This is due to the omission of the proper brining process. The use of alum as a hardening agent is not necessary.

**Softening**—This is due to bacterial action.

If vinegar or brine is too weak, pickles may soften from fermentation. Pickles kept in too warm storage often become soft.

Vinegar boiled too long loses strength and may cause softening.

Pickles cooked too long soften from overcooking.

Pickles exposed above the brine or vinegar become soft.

Once pickles have become soft, they cannot be restored to firmness and crispness.

**Shrivelling**—If the vinegar is too hot or too strong when poured over fruits or vegetables, it may cause them to shrivel. Too strong a brine or too much sugar will also cause shrivelling.

Sweet pickles very often shrivel due to the combination of over-cooking, too much sugar, and too strong a vinegar.

**Scum**—Top layers of vegetables fermented in brine will spoil unless the scum is frequently removed. If allowed to remain, the vegetables underneath are attacked and broken down. Top layers are the first attacked. The lower layers of the pickles may be saved by removing the top layers, adding a little fresh brine, and pouring hot paraffin over the surface.

**Bitter Flavor**—A bitter flavor may be caused by boiling the spices in the vinegar too long or by using too much spice.

**Poor Color**—This is also due to the omission or shortening of the brining process upon which the dark green color and translucent appearance depend.

## ACKNOWLEDGMENT

Suggestions and recipes are many of them taken from U. S. D. A. Farmers' Bulletin 1438 and from publications of the United States Bureau of Home Economics.