Preservation of Food in the Home

NORTH DAKOTA AGRICULTURAL COLLEGE

AGRICULTURAL EXTENSION DEPARTMENT

THOMAS P. COOPER, Director.

AGRICULTURAL COLLEGE, NORTH DAKOTA

Distributed in furtherance of Cooperative Agricultural Extension Acts of May 8 and June 30, 1914
Preservation of Food in the Home

MAY C. MCDONALD

Dietary studies and investigations have demonstrated the value of fresh succulent foods, as fruits and vegetables. In the past such foods were included in the dietary (food supply) chiefly because of their pleasing appearance, appetizing nature and because of the variety which they afforded. Their presence in the dietary of a given family depended largely on proximity to gardens or markets and eating habits. Their seasonal character made them abundant at one time of the year and scarce at another. This condition was tolerated as long as their only recognized value was the furnishing of variety. Now that their high value is known, steps should be taken to make such foods available for use during the entire year. Vegetables and fruits furnish sugar and starch, mineral matter, water and fibrous material. The mineral matter is valuable as it furnishes material for the construction and maintenance of tissue and body fluids and exerts a regulating effect on bodily functions. Because of their high water and fiber content their use adds the necessary bulk to the diet.

It has been shown that families having a diet adequate in fruit and vegetables during twelve months of the year are maintained in better physical condition than those whose diet lacks such materials. In cases of diets poor in vegetables and fruits or those in which such products are abundant for only three or four months, recourse to medicinal help is more frequent. For many families this means the use of patent medicine. Even though some medicinal materials might be furnished by a spring tonic, (which is open to question in the case of most patent tonics), the fact remains that the results may be obtained in better form from the products of the garden, either fresh or canned.

According to results commonly obtained with vegetables in North Dakota, a garden of from one-third to one-half acre will furnish sufficient fresh vegetables for the average family’s use during the summer and also a surplus to store or can.

The produce from such a garden would be worth from $50 to $75 if sold at wholesale prices or approximately $125 if purchased at retail prices. If purchased as canned goods the cost would be at least $300.

During the past few years the United States Department of Agriculture, various experiment stations and others have been evolving means or methods by which the products of the garden may be made available in the dietary of the family during the entire year. This bulletin though it represents some original work upon the part of the author, is chiefly a compilation of the available information from all sources and the adaptation of such material to local conditions.

Before describing the methods of preserving foods in the home, a brief discussion will be given concerning the causes of spoilation; the conditions necessary for growth and development of the destructive agents; and the conditions which prevent or delay that growth and development.
REASONS FOR SPOILING

REASON FOR SPOILING

Foods spoil for two reasons. The continuance of the ripening changes to the point where the foods deteriorate in quality and are rendered unfit for use. The presence and action of micro-organisms which feed upon it and render it unfit for use. The agent which causes the ripening changes is called an enzyme. These ripening changes continue after the gathering of the fruit or vegetables. This determines the storage possibilities of any product. Apples may be stored because in them the change is slow, while the rapidity of the change in peaches makes storage for any length of time impossible. The same difference is noted in vegetables, for example carrots and corn.

STALE FRUIT OR VEGETABLES

The loss or change of flavor when fruits or vegetables are permitted to stand after gathering is a matter of common observation.

Fig. No. 1—A North Dakota Garden Well Located and Arranged.

For example, fresh corn on standing becomes less sweet. The sugar present in the corn when gathered is changed by the enzyme to starch (which is less sweet). This will continue until the enzyme is killed by the heat of cooking. This has a practical application to all cooking as well as canning. The period intervening between gathering and cooking should be as short as possible.

PREVALENCE OF MICRO-ORGANISMS

Micro-organisms (bacteria, yeast and molds) are ever present. Not only are they found on the food material itself but they are present in the air, soil, dust, water, and may be on the utensils used. It is therefore very necessary for the housewife to learn the life-history of these destructive agents, the conditions under which they live and grow and the methods by which they may be killed or their action stopped.
CONDITIONS NECESSARY FOR GROWTH

Food, moisture, and a favorable temperature are the factors necessary for growth and development of these micro-organisms. They live best at the same temperature as our own bodies. At a lower temperature life may continue but development is arrested. Extremely high temperatures destroy them.

MEANS OF DESTRUCTION

All living micro-organisms are destroyed by boiling or sterilizing. (A thermometer placed in boiling water will register 212° Fahrenheit or 100° Centigrade.) Some micro-organisms are able to produce a seed-like form called a spore. In this form they are more resistant to heat. Increased temperature will destroy, or if a certain period is allowed between boilings, the spore has an opportunity of changing from the inactive resistant form to the living form. A subsequent boiling will then kill.

Fresh fruits that deteriorate rapidly may be preserved by drying. The amount of water necessary for continued life and development of the micro-organism is 30 per cent. Drying is not used as much as formerly, chiefly because it is a slow process. The bulk of the material is appreciably reduced without any loss of food value. The flavor is frequently retained to a greater extent than is the case with other methods.

Fig. No. 2—A Home Made Water Bath Canning Outfit. (Note false bottom.)
METHODS OF PRESERVATION

Thus we have various methods of preservation in common use today, based upon the above information:

- Low temperature (cold storage).
- High temperature (sterilization).
- Drying (reduction of water content below 30 per cent).

In addition to the above, foods may be preserved by means of household preservatives.

PRESERVATIVES

These act in various ways to prevent the growth of bacteria. The household preservatives which are known to be harmless are sugar, spices, vinegar. Most chemical preservatives are harmful.

Fig. No. 3—A Water Seal Canning Outfit.

There is a class (sodium benzoate, and boraxic acid), the degree of harmfulness of which has not been determined. Even if future investigation proves them to be harmless, it would be well for the housewife to discontinue their use—at best they are only a substitute for careful, intelligent work. The law may permit the use of such chemicals in factories under controlled conditions and in the hands of chemically trained workers. But the housewife buying such chemicals under the name of "canning powders or compounds" has practically no information concerning the ingredients of the powder, and has no means of accurate measurement. For example, one of the most widely advertised and most generally used "compounds" gave the following test: 94.6 per cent boraxic acid and 5.4 per cent common salt. Under the conditions which prevail in the average home, even the most harmless of such "compounds" are pernicious.
To keep perishable food materials for an indefinite period, retaining as far as possible their natural flavor, color, texture and condition. This may be accomplished by killing all micro-organisms which may be present on the material, utensils or cans, and preventing the subsequent entrance of these agents of spoilation (micro-organisms).

STERILIZATION

Much time, energy and material is wasted because people frequently either fail to understand what complete sterilization means or refuse to admit its importance. Here half-way measures are sure to fail.

![Fig. No. 4—A Steam Pressure Outfit.](image)

CONDITION OF MATERIALS

It is an invariable rule that good materials properly handled will make good canned products, but the best possible handling cannot change inferior materials. Fruits and vegetables should be canned when at their best (the proper degree of maturity). For example, such green vegetables as peas and corn are very sweet in the early part of the season. When more mature a large amount of this sweetness leaves them (due to the change of sugar into starch). Other vegetables become more rank in flavor or more fibrous in texture as the season advances. Fruits and vegetables should be canned as soon as possible after gathering, as this prevents the loss of flavor due to the change from sugar to starch brought about by the action of enzymes present.
CANS OR JARS

Glass jars or tin cans are equally good as far as keeping qualities are concerned. The initial cost of tin is less, but it is usually necessary to get a new supply each year. Glass jars, though more expensive in the beginning, will last indefinitely with proper care. For packing and shipping purposes tin cans are preferable.

CHARACTERISTICS OF A GOOD GLASS JAR

1. Should be air-tight.
2. No metal should come in contact with the contents.

3. Parts of top, coming in contact with food material, should be all in one piece.
4. Side of jar should be as nearly straight as possible.
5. Opening (or mouth) large.
6. Edges of jar or top should be smooth and even.

There are many types of jars which conform to the above requirements, each type having certain advantages. The most popular types are those having glass tops held in place by metallic contrivances of various designs.

RUBBERS

Probably more time and material is wasted through the use of old or inferior rubber rings than in any other way. Always use...
new rings. Test the rings by pressing a fold of the ring in the same spot first on one and then on the other side. If even a slightly cracked appearance results from such pressure, discard the rubber. Stretch the rubber and discard all that show effects of strain or do not seem elastic.

COVERS

If screw top covers are used, be sure that the edge is even and that they make the can air-tight. Prying up the cover of a can with a case knife frequently ruins it for future use.

The proper way of opening a screw top can is to take the rubber between the thumb and the forefinger or between the thumb and a blade of a knife and pull until it is removed from between the cover edge and the flange of the jar. Sometimes it is necessary to break the rubber. After the loosening or removal of the rubber the cover may be easily unscrewed.

CANNING APPARATUS

There are a large number of home canning outfits on the market today, each having its own peculiar merits. Many home made devices are in successful use. It is never wise to invest in a canning outfit until one is convinced that that particular outfit best meets the peculiar home needs. Thoroughly master the art of canning by the use of a simple home made device, and then the choice of an outfit that will meet the needs will be an easy matter.
TYPES OF CANNERS

1. Hot water outfits:
   Home made.
   Commercially made.
2. Water seal outfits.
3. Steam pressure.
4. Aluminum pressure cooker.

HOT WATER OUTFITS. (See Fig. 2.)

For the home made outfit, any utensil which may be fitted with a tight cover may be used (wash boilers, tin pails, milk cans, lard pails, etc.). A false bottom or rack which will permit a circulation of water should be provided, something metallic is best, but wooden slats or a board with holes bored through it will suffice if necessary. Lifting handles attached to the rack are a great convenience.

COMMERCIAL HOT WATER BATH OUTFITS

These are constructed for out-of-door use. In one piece they combine a fire box, smoke pipe and a vat for sterilizing. Lifting trays for the jars are also provided. Here the jars (completely sealed tin cans or partially sealed glass jars) are placed in the lifting trays and lowered into the water of the sterilizing vat.

The action of these two types is identical—the only advantage the commercial outfits has over the home made is that the completeness of the equipment makes for greater convenience.

WATER SEAL OUTFITS. (See Fig. 3.)

These are made in three pieces, the container, cover, and rack, each resembling a straight sided pail. The rack has holes bored in the sides. The container has two walls about two inches apart, the inner wall being shorter. The cover is fitted with a thermometer and safety valve. When the cover slips into place between the two walls, it forms two columns of water. This makes it possible to obtain a temperature higher than boiling.

The chief advantage which the water-seal outfit has over the water bath outfit is that the possibility of maintaining a higher temperature reduces the necessary cooking time. The thermometer also gives accuracy.

STEAM PRESSURE OUTFITS. (See Fig. 4.)

These are made of various materials, from cast-iron to aluminum and are equipped with a lifting crate, thermometer or pressure gauge, safety valve and steam release cock. From five to thirty pounds pressure may be carried. By the regulation of the pressure, the temperature necessary for a given material may be maintained. The advantage which this apparatus has over the two previously described is that the time necessary for cooking may be greatly shortened.

ALUMINUM PRESSURE COOKER. (See Fig. 5.)

This cooker is equipped with pressure gauge or thermometer, steam release cock and safety valve and is useful for general cooking as well as canning, particularly meats and cereals. Although it differs in size and shape from the pressure outfits described above, the principles of construction are the same. The fact that aluminum transmits heat very rapidly makes it the quickest canning and cooking outfit.
ACCUKATE MEASUREMENT OF TEMPERATURE

Housewives are beginning to recognize the need of accurate measures and tests for all household processes. Nowhere is accuracy more important than in the measurement of temperature in canning. Most directions for canning call for a certain length of time for boiling. This means after the water in the container is actually boiling. In common practice the period is frequently measured from the time that the water begins to bubble. The following is a simple, practical gauge by which the temperature of water may be estimated:

1. When bubbles stick to the bottom of the container, the temperature is about 160° to 170° F.
2. When the bubbles let loose and rise to the top the temperature is 180° to 190°.
3. When the water begins to circulate gradually the temperature is about 200° to 205°.
4. When it kicks up over the entire surface it is boiling, or 212°.

Water boils at different temperatures at different altitudes. At sea level it boils at 212° Fahrenheit; at 500 feet above sea-level at 211°; at 1,000 feet above at 210° etc. The time tables sent out by the U. S. Department of Agriculture in their various bulletins and leaflets are based upon the altitude of 500 feet above sea-level. As the average altitude of North Dakota is about 1600 feet above sea-level, from five to ten minutes should be added to the cooking time when such directions are used. The time given in this bulletin is for average North Dakota altitude.

METHODS OF CANNING

1. Open kettle or not pack method.
2. Intermittent or fractional sterilization.

OPEN KETTLE METHOD

The open kettle method is the oldest and most common one. Here the products are thoroughly cooked in the kettle and then packed in the hot sterilized jars. As the product is handled and packed after sterilization, there is danger of the entrance of new spores and bacteria. This method, though successful with fruits and a few vegetables, fails with most vegetables. At best it is laborious and inconvenient.

INTERMITTENT OR FRACTIOHAL STERILIZATION METHOD

This method is based upon the fact that some bacteria are capable of forming a spore (seed-like body) which is more resistant to unfavorable conditions. Spores are not killed by boiling water unless the boiling is continued for some time. They can be killed by heating at a temperature higher than boiling, or left after boiling under favorable conditions for twenty-four hours they will develop into an active form and then may be killed by simple boiling.

In this method the material is packed in the jars which are then placed in the canner filled with cold water. This is heated to boiling and maintained at that point for one hour (for most vegetables). The jars are then set aside until the second day, and the process repeated. After boiling on a third day, the covers are tightened and the product prepared for storage.

Corn, beans and peas are the materials usually canned by this
method, but it may be applied to greens and other vegetables. The cold pack method is rapidly gaining in favor and succeeding the intermittent process because of its greater convenience.

COLD PACK METHOD

By this method the fresh products are packed cold into the jars (after blanching and cold dipping,) and the sterilization done in a single period. As the jars are partially sealed before sterilization, the further entrance of bacteria or spores is impossible. Fruits, vegetables and meats may all be successfully canned by this method.

THE CANNING PROCESS

The canning should be done at a time when there will be the least possible interruptions. Much nervous strain is thus avoided. Canning is an operation in which dispatch means much.

Collect all utensils and materials to be used—arrange them so that they will be convenient. Place table near stove and water supply to avoid lifting and carrying. Clean all jars, covers, etc. Test jars by partly filling with water, adjust rubber and cover, invert. If jar leaks, try another rubber or cover. If jar continues to leak, discard it. Place jars and covers in basin of water so that the covers do not get mixed, thus losing the value of previous testing. Bring water up to the boiling point and keep it at that point. Jars and covers should be left in the boiling water until needed.

There are certain principles which apply to the canning of all products. For the sake of brevity the various steps in the process which apply to all types of materials will be explained first, and the various cases noted where modifications of the general rules are necessary for a particular food product.

Summary of Steps of Cold-Pack Process. (See Fig. 6.)
- Preparation of equipment, utensils, etc.
- Preparation of material.
- Blanching.
- Cold dip.
- Filling of jars—adjusting of rubbers and covers.
- Sterilizing or processing, or cooking period.
- Final sealing.
- Storage.

PREPARATION OF MATERIAL

The grading of materials by separating in lots according to size and degree of maturity is as necessary in home canning as in commercial canning. This insures uniform cooking, better appearance and the greatest usefulness. The materials should be thoroughly cleansed, care being taken not to bruise or mutilate unnecessarily. Discard any doubtful material.

BLANCHING

Blanching is the result obtained from the treatment of the material with boiling water. The length of contact differs with different materials. Some are simply dipped into the boiling water, others are left boiling for varying periods according to their nature and condition. (See table, page 16.)
The purposes of blanching are:
1. To loosen the skin.
2. Reducing bulk.

A wire basket is usually the most convenient utensil to hold the product while blanching and cold dipping. Squares of cheese cloth or loose woven sacks are good substitutes.

**COLD DIP**

The material taken from the blanching kettle should be plunged immediately into a vessel containing enough cold water to thoroughly immerse and stop the cooking process started by the blanching. Care should be taken that the water comes quickly into contact with every part. In the case of small products or those that pack tightly, this may be facilitated by gentle shaking of the wire basket or container. Do not allow material to soak in the water. Purpose of cold dip:

1. To harden the flesh of fruit or vegetables and thus facilitate the removal of the skin.
2. Stop the flow of juice and coloring matter begun by blanching, thus preventing the loss of color and flavor.

**FILLING JARS**

Final preparation of fruit or vegetables, such as paring, scraping, slicing, etc., should be done as quickly as possible and the product immediately packed in the jars which are removed, as needed, from the pan of boiling water. Pack closely to economize jar space and diminish the amount of liquid canned. Fill with boiling water or syrup, pouring hot liquid slowly on the material to lessen danger of cracking. In the case of vegetables, one teaspoon of salt should be added to the vegetables before filling with water. With fruits, syrup of proper density is used instead of water. Adjust rubbers and partially seal. In case of glass topped jars, adjust the top spring only. In case of screw top jars, screw down top until it touches the rubber, or screw down entirely and reverse a quarter of a turn. This will permit the escape of air. (Water will not penetrate the jar through this loosened seal.)

**STERILIZING OR PROCESSING**

In most canning instructions these two terms (sterilizing and processing) are used practically interchangeably. Sterilizing means the boiling of a material for a sufficient time to cause the destruction of micro-organisms. The length of time necessary differs with the various food products and various types of organisms. Thus the products rich in acids such as tomatoes, strawberries, etc., require a shorter amount of time than those rich in nitrogenous material (protein) such as peas, corn, meat, etc.

This step is the most important as success depends upon the careful observance of the following precautions:
1. Use a boiler or other container with a tight cover and false bottom.
2. Have sufficient water in boiler to completely cover the jars.
3. Breakage and loss may be prevented by not placing cold jars in (to) hot water or hot jars in (to) cold water.
4. Begin to count time after the water in which the jars are immersed begins to boil vigorously. Directions and time tables usually apply to quart jars. If pint or two quart jars are used, diminish or increase the time about five minutes.

5. After sterilizing for a given time, remove, seal tightly, invert to test and set aside to cool.

**STORAGE**

Wrapping jars in paper or storing in a dark place will prevent bleaching. A well ventilated cellar or conveniently situated cupboard make satisfactory places for storage for canned goods.

**CANNING OF VEGETABLES**

The details of canning of vegetables will be presented by reviewing the process in detail with one vegetable and later noting the vegetables wherein modifications of the process are necessary.

**GREENS**

The infrequent use of this food product is deplorable when one realizes that it furnishes such valuable mineral material so cheaply and in such acceptable form. Their common use, especially during the winter months, would go far toward overcoming the noticeable mineral deficiency in our winter diet. As they are obtainable in large quantities in both wild and tame varieties, there is little reason for any family not having an adequate supply for all seasons.

The following list of edible greens is given in the U. S. Department of Agriculture, Form NR 24.

**EDIBLE CULTIVATED GREENS**

- Swiss chard
- Kale
- Chinese cabbage leaves
- Upland cress
- French endive
- Cabbage sprouts
- Turnip tops
- New Zealand spinach
- Asparagus
- Spinach
- Beet tops
- Cultivated dandelion
- Daikon sprouts
- Native mustard
- Russian mustard
- Collards
- Rape

**EDIBLE WILD GREENS**

- Pepper cress
- Lamb's-quarter
- Sour dock
- Smartweed sprouts
- Purslane or "pursley"
- Pokeweed
- Dandelion
- Marsh marigold
- Wild mustard
- Milkweed (tender sprouts and young leaves)

Any of the above may be successfully canned at home either individually or in any desired combination.

**TO CAN GREENS**

Can as soon after picking as possible, at least on the the same day. Clean thoroughly. Greens should be blanched for 15 to 20 minutes, as the bulk should be noticeably reduced in order to save jar space. This may be done in an ordinary kettle, using as small an amount of water as possible. Steaming is preferable as less juice is lost by this method.
Plunge quickly into cold water. Pack tightly in sterilized jars. Season with a level teaspoon of salt to a quart and add any other desired seasoning. A small amount of chipped beef or bacon makes a splendid flavor. Olive oil may also be added. Fill the crevices with hot water, adjust the rubber and covers and sterilize, for 150 minutes in the home made outfit, 60 minutes in the water-seal outfit, and 50 minutes in steam pressure under five pounds of steam. Remove from canner. Tighten covers. Invert to test joints and cool. Wrap in paper to prevent bleaching and store.

Asparagus:—In blanching asparagus it is best to lower basket containing stalks into water in such a way that tops are not in water during first half of blanching period. Immerse tops for last half. In this way the falling to pieces of tops is prevented.

Carrots-Beets:—To save the juices, these are cleaned and blanched and dipped before they are wrapped. In the case of beets, leave on most of the tail (or root) and one inch of the leaf stems to prevent bleeding. Sixty minutes is sufficient time for sterilizing baby beets and carrots, but 90 is needed for more mature ones.

Corn:—Blanch and dip before cutting from the cob, thus saving much milk. Use the water from such cooking for filling the jars.

Cauliflower:—Should be carefully cleaned and soaked in salt water at least twenty minutes—two hours is preferable. If head is fresh and tender, 45 minutes is sufficient for sterilizing, but in case of doubt, 60 minutes may be better.

Tomatoes:—Sort, clean, blanch and give cold dip before peeling. The alternate heat and cold of the blanching and dipping will make the skins slip easily. If the tomatoes are cut up, fill the jars full and do not add water. If canned whole, fill the crevices with tomato juice instead of water.

Beans of all kinds, peas, carrots, asparagus, okra, kohlrabi, turnips, and in fact every type of vegetable may be successfully canned by the cold pack process. Various vegetables, like carrots and peas may be canned together if desired.

It should always be borne in mind that of the two chief factors in successful canning, one is the freshness and degree of maturity of the vegetables, and the other is thoroughness of sterilization.

Some Failures and Their Causes

When a sour taste develops in corn, peas, beans or asparagus after canning, it is usually due to the fact that the vegetable was allowed to stand too long between picking and canning. This is known as "flat sour".

Dark color in canned corn may be due to too long a period of blanching (3 to 5 minutes is enough for white corn); old corn, or the use of water containing a large amount of iron.

Soggy corn is caused by allowing corn to stand in cold water too long after the hot dip. Or allowing the jars to stand too long between filling and sterilizing. Also from heating the corn in warm water over a slow fire.
Cloudy peas are caused by the cracking of the skin of the pea; by blanching for too long a period. Frequently caused by the use of very hard water.

Shrinkage of the product during canning is due to improper grading and using a variety of sizes, careless packing, insufficient blanching and cold dipping or sterilizing for too long a period.

Loss of liquid during canning is due to not having water in the sterilizing vat cover the top of the jars by at least one inch. Unless the jars are placed on a rack which will allow circulation of water beneath them, the water in the jars will boil down. Some loss is due to insufficient tightening of the covers.

Mold which forms after canning is usually due to leaky rubbers or defective joints. Frequently the tops of jars are removed at the end of the sterilizing period to substitute new rubbers or covers. The possibility of mold resulting from this may be prevented by returning such jars to the sterilizing vat for five or ten minutes.

Tomatoes may sometimes show a large amount of acidity after canning. This is usually due to climatic conditions and may arise from using over or under-ripe product. The addition of one-fourth teaspoonful of baking soda to one quart of tomatoes will counteract this acidity.

There are many reasons for the breakage of jars. Too sudden change of temperature caused by putting cold jars into hot water; hot liquid into cold jars; hot jars into cold water; cold liquid into hot jars, etc., insufficient circulation of water beneath the jars while sterilizing; a cold draft on a hot jar; and defects in the jars themselves (this however should be noticed when testing).

Some vegetables as corn, pumpkin and sweet potatoes, swell during the sterilizing process. Packing these products too tightly is another cause of jar breakage.
TIME TABLE FOR HOT WATER OUTFITS

(Both Home Made and Commercial)

<table>
<thead>
<tr>
<th>Item</th>
<th>Blanching (minutes)</th>
<th>Sterilizing (minutes)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Apples</td>
<td>1-2</td>
<td>15-20</td>
</tr>
<tr>
<td>Asparagus</td>
<td>5-8</td>
<td>90</td>
</tr>
<tr>
<td>Beets</td>
<td>5-7</td>
<td>60-90</td>
</tr>
<tr>
<td>Beans</td>
<td>2-5</td>
<td>90-120</td>
</tr>
<tr>
<td>Carrots</td>
<td>3-5</td>
<td>60-90</td>
</tr>
<tr>
<td>Cherries</td>
<td>1</td>
<td>16</td>
</tr>
<tr>
<td>Cauliflower</td>
<td>3</td>
<td>15-60</td>
</tr>
<tr>
<td>Corn</td>
<td>5-15</td>
<td>180</td>
</tr>
<tr>
<td>Corn (on cob)</td>
<td>5-15</td>
<td>180</td>
</tr>
<tr>
<td>Grapes</td>
<td>not blanched</td>
<td>8-16</td>
</tr>
<tr>
<td>Greens</td>
<td>15-20</td>
<td>150</td>
</tr>
<tr>
<td>Peas</td>
<td>2-5</td>
<td>120</td>
</tr>
<tr>
<td>Pears</td>
<td>1-2</td>
<td>16</td>
</tr>
<tr>
<td>Raspberries</td>
<td>not blanched</td>
<td>8-16</td>
</tr>
<tr>
<td>Strawberries</td>
<td>not blanched</td>
<td>8-16</td>
</tr>
<tr>
<td>Tomatoes</td>
<td>1-3</td>
<td>22-25</td>
</tr>
<tr>
<td>Beef</td>
<td>30</td>
<td>500</td>
</tr>
<tr>
<td>Pork</td>
<td>30</td>
<td>240</td>
</tr>
<tr>
<td>Chicken</td>
<td>30</td>
<td>210</td>
</tr>
</tbody>
</table>

While the aluminum pressure cooker is not in common use today, interest in it has grown to the point where it seems advisable to include the following table.

TIME TABLE FOR USE WITH ALUMINUM COOKER

<table>
<thead>
<tr>
<th>Pressure (lbs.)</th>
<th>Time (min.)</th>
<th>Pressure (lbs.)</th>
<th>Time (min.)</th>
<th>Pressure (lbs.)</th>
<th>Time (min.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Apples</td>
<td>15</td>
<td>6</td>
<td>Cherries</td>
<td>15  5</td>
<td></td>
</tr>
<tr>
<td>Asparagus</td>
<td>20</td>
<td>25</td>
<td>Cauliflower</td>
<td>30  20</td>
<td></td>
</tr>
<tr>
<td>Beets</td>
<td>20</td>
<td>35</td>
<td>Corn</td>
<td>35  10</td>
<td></td>
</tr>
<tr>
<td>Beans</td>
<td>20</td>
<td>40</td>
<td>Grapes</td>
<td>15  5</td>
<td></td>
</tr>
<tr>
<td>Carrots</td>
<td>20</td>
<td>35</td>
<td>Greens</td>
<td>35  5</td>
<td></td>
</tr>
</tbody>
</table>

Material for this table was taken from the directions issued by the government canning experts. (See list of publications.)

CANNING OF MEATS

The following recipes for meat canning have been furnished by the U. S. Government Canning Experts. These will prove of practical value to the farm woman and distribute the canning work through the entire year. When the poultry flocks are being celled in the fall, all the surplus fowls may be killed and canned in a comparatively short time, thus saving winter feeding and the frequent cooking of one or two fowls at a time. During winter months an extra animal may be especially fed then slaughtered, and canned. In this way a generous supply of meat is provided the year around for those who are remote from markets or who lack sufficient refrigerator space to keep fresh meats during hot weather. The thrifty housewife rejoices in the fact that her jars are in constant use, filled with fruit and vegetables in summer, then emptied and filled with meat in winter. At all times
of the year, the canned meats will be found useful, in emergencies and in saving time and energy during the busy seasons. Even the town woman who finds it possible in the winter to buy a quarter of beef or half a pig, will find it an economical way of taking care of that which the family do not wish to consume within a short time.

POULTRY AND GAME

Recipe No. 1:—Kill the fowl and draw at once; wash carefully and cool; cut into convenient sections. Place in wire basket or cheesecloth and boil until meat can be removed from bones; remove from boiling liquid, and remove meat from bones; pack closely into glass jars; fill jars with hot liquid, after it has been concentrated one-half; add level teaspoonful of salt per quart of meat for seasoning; put rubber and cap into position, not tight; and sterilize the length of time given below for the one particular type of outfit you are using:

<table>
<thead>
<tr>
<th>Method</th>
<th>Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>Water bath, home made or commercial</td>
<td>3 1/2 hours</td>
</tr>
<tr>
<td>Water seal, 214°</td>
<td>3 hours</td>
</tr>
<tr>
<td>5 lbs. steam pressure</td>
<td>2 1/2 hours</td>
</tr>
<tr>
<td>10 lbs. steam pressure</td>
<td>2 hours</td>
</tr>
</tbody>
</table>

Remove jars; tighten covers; invert to cool and test the joints; wrap jars with paper to prevent bleaching.

Recipe No. 2:—Kill fowl and draw at once; wash carefully and cool; cut into convenient sections and pack at once into glass jars; fill with boiling water; add level teaspoonful of salt per quart; put rubber and cap in position, not tight, and sterilize the length of time given below for the particular type of outfit you are using:

<table>
<thead>
<tr>
<th>Method</th>
<th>Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>Water bath, home made or commercial</td>
<td>4 hours</td>
</tr>
<tr>
<td>Water seal, 214°</td>
<td>3 1/2 hours</td>
</tr>
<tr>
<td>5 lbs. steam pressure</td>
<td>3 hours</td>
</tr>
<tr>
<td>10 lbs. steam pressure</td>
<td>2 1/2 hours</td>
</tr>
</tbody>
</table>

Remove jars; tighten covers; invert to cool and test the joints; and wrap jars with paper to prevent bleaching.

FRESH BEEF

As soon as beef has been butchered, cool quickly and keep cool for about 24 hours. Cut the beef into convenient pieces for handling, about 3/4 lb. in weight, and roast or boil slowly for one-half hour. Cut into small pieces, removing gristle, bone, and excessive fat, and pack directly into glass jars; fill with gravy from the roasting pan, or pot liquid, concentrated to one-half its volume; put rubber and cap in position, not tight, and sterilize the length of time given below for the particular type of outfit you are using:

<table>
<thead>
<tr>
<th>Method</th>
<th>Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>Water bath, home made or commercial</td>
<td>5 hours</td>
</tr>
<tr>
<td>Water seal 214°</td>
<td>4 1/2 hours</td>
</tr>
<tr>
<td>5 lbs. steam pressure</td>
<td>3 1/2 hours</td>
</tr>
<tr>
<td>10 lbs. steam pressure</td>
<td>3 hours</td>
</tr>
</tbody>
</table>

Remove jars; tighten covers; invert to cool and test the joints; and wrap jars with paper to prevent bleaching.
CANNED PORK

After the animal has been killed, cool quickly and keep the carcass cool at least 24 hours; can only lean portions, using the fat to make lard; place meat in a wire basket or cheesecloth and boil 30 minutes, or roast in the oven 30 minutes. Cut into small sections and pack closely into glass jars; put rubber and cap in position, not tight; and sterilize the length of time given below for the particular type of outfit you are using:

- Water bath, home made or commercial .................................................. 4 hours
- Water seal, 214" ................................................................................... 3 ½ hours
- 5 lbs. steam pressure ........................................................................ 3 hours
- 10 lbs. steam pressure ........................................................................ 1 ½ hours

Remove jars; tighten covers; invert to cool and test the joints; and wrap jars with paper to prevent bleaching.
CANNING OF FRUITS

The general procedure with fruit is practically the same as in the case of vegetables except the substitution of syrup for water as a filler and slight variations in preparation due to differences of texture. As a class, fruit are more easily sterilized than vegetables.

SUGAR SYRUPS

The following table and definitions are taken from Form NR 33, States Relations Service, Office of Extension Work North and West, Washington, D. C.

"Sugar syrups are made by boiling sugar and water together to a certain density. This density, expressed as 'degree', or 'per cent', is measured by a density gauge, and also by what is sometimes termed a 'mental-finger gauge', which furnishes, of course, only an approximate estimate of the density or 'concentration' of the syrups.

'The following syrup table is computed on the number of pounds of sugar in 100 pounds of solution, and therefore, is called a 'per cent table'.

<table>
<thead>
<tr>
<th>Sugar</th>
<th>Water</th>
<th>Per cent</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 pound</td>
<td>3 quarts</td>
<td>16</td>
</tr>
<tr>
<td>1 pound, 4 ounces</td>
<td>3 quarters</td>
<td>20</td>
</tr>
<tr>
<td>1 pound, 9 ounces</td>
<td>3 quarters</td>
<td>25</td>
</tr>
<tr>
<td>2 pounds, 8 ounces</td>
<td>4 quarters</td>
<td>30</td>
</tr>
<tr>
<td>1 pound</td>
<td>1½ quarters</td>
<td>32</td>
</tr>
<tr>
<td>2 pounds, 3 ounces</td>
<td>3 quarters</td>
<td>35</td>
</tr>
<tr>
<td>2 pounds, 8 ounces</td>
<td>3 quarters</td>
<td>40</td>
</tr>
<tr>
<td>3 pounds, 2 ounces</td>
<td>3 quarters</td>
<td>45</td>
</tr>
<tr>
<td>3 pounds, 7 ounces</td>
<td>3 quarters</td>
<td>50</td>
</tr>
<tr>
<td>3 pounds, 12 ounces</td>
<td>3 quarters</td>
<td>60</td>
</tr>
</tbody>
</table>

"The formula much used in the West for syrup is 3 quarts of sugar to 2 quarts of water, boiled to a thin, medium-thin, medium-thick, or thick syrup. The formula sometimes called the Eastern formula is 3 quarts of water to 2 quarts of sugar, boiled to a thin, medium-thin, medium-thick, or thick syrup."

APPROXIMATE DENSITY TERMS EXPLAINED

1. "Thin syrup is sugar and water boiled sufficiently to dissolve all sugar; but is not sticky.
2. "Medium-thin syrup is that which has begun to thicken and becomes sticky when cooled on the finger tip or spoon.
3. "Medium-thick syrup is that which has thickened enough to roll or pile up over the edge of a spoon when you try to pour it out.
4. "Thick syrup is that which has become so thick that it is difficult to pour out of a spoon or container (not sugared).

Thin syrups are used for all sweet fruits that are not too delicate in texture and color, such as cherries, peaches, apples, etc.

Medium-thin syrups are used in the canning of the medium-sweet fruits, such as blackberries, currants, dewberries, huckleberries, raspberries, etc.

Medium-thick syrups are used in the canning of all sour fruits, such as gooseberries, apricots, sour apples, etc., and delicately colored fruits, such as strawberries and red raspberries.

Thick syrup is used in preserving and in making all kinds of sun preserves."

Fruit usually demands more careful handling than vegetables. Delicate berries such as strawberries should be washed carefully before hulling or "stemning". The fruit is bruised less if a sieve is used. If running water is available, let a gentle stream play over the berries. If not, lift the sieve up and down in a vessel of water.
To prevent the discoloring of apples, place them as soon as pared in slightly salted water (1 teaspoon to a quart). Allow apples to remain in water until placed in jar.

The skins of fruit such as peaches, plums, etc., are easily slipped after the hot and cold dip.

The use to which the canned product is to be put determines whether it shall be canned whole or cut. For salad and sauce, preference is usually given to whole or halved fruits. For pies, pudding, etc., the fruit may be cut up.

For the necessary cooking time see table on page 16. This varies according to the kind of fruit and the type of canner used.

CANNING OF FRUIT JUICES

Because of their excellent character and many uses, fruit juices should be canned more extensively. Any juicy fruit will give a good return in bottled juice. This may be extracted cold by the use of a fruit press as in cider making, or in a smaller press. In case a press is not available, the fruit may be cooked until the juice is extracted, then drained as in jelly making. The extracted juice may then be put in bottles, sterilized, securely corked, sealed and labeled.

PRESERVATION BY MEANS OF SUGAR

Sugar was used as a preservative long before our knowledge of bacteriology had progressed to the point where the canning process was evolved.

There are two reasons for the prevalence of the use of sugar as a preservative. Liquids which contain sugar can be heated to a much higher temperature than that to which water alone can be heated; hence complete sterilization is more easily effected. Furthermore, micro-organisms cannot live in a concentrated sugar solution. This also accounts for the fact that jellies and preserves may be kept without being sealed air-tight. Concentrated sugar solutions absorb moisture from the air very readily. Unless the product is well covered, there is the possibility of the absorption of sufficient moisture to give favorable condition for the development of micro-organisms. Paraffin is perhaps the best and most convenient covering. A tin cover or heavy paper should be used to protect the paraffin from being cracked.

As there has been, in the past, practically no standardization of preserved products, much confusion of terms has resulted. A basis for standardization will be presented by taking the products up one by one, giving the definition and the process of making.

JELLY

The following splendid definition of jelly is given by Miss Goldthwaite.*

In order to make good jelly a fruit juice must contain certain ingredients, acid and pectin. The changing of the juice from a liquid to a solid is brought about by the combined effect of sugar, acid, and boiling upon the pectin of the fruit juice. The properties of pectin (which is a carbohydrate) need not be discussed here. It is sufficient for our purpose to know that it is a necessary constituent and to know how to test for its presence.

**TEST FOR PECTIN**

To a small amount of cold fruit juice add an equal amount of ordinary alcohol (90 to 95%). If pectin is present, a gelatinous mass will appear which can be gathered on the end of a spoon. If there is no pectin present, the solution should remain clear.

Fruits suitable for jelly making are: currant, ripe and partially ripe, grapes, crabapple, sour apples and plums. Raspberries may be used, though they jell less readily. Some fruits contain sufficient pectin but are deficient in acid, such as peaches, quince, pears and sweet apples. A fruit that jells with difficulty may be combined with one that jells readily. Thus apples, though possessing little flavor, have all the necessary jellying qualities. When any desired flavor is added, good jelly results.

**SUPPLYING DEFICIENCIES**

It is of course possible to supply the deficiency of either acid or pectin. In oranges and lemons, the white material between the pulp and yellow rind is very rich in pectin. This may be extracted by grinding or chopping fine the thick white part, soaking in cold water twelve to twenty-four hours, and then simmering an hour. Care should be taken to remove with sharp knife all the yellow portion before grinding. This extraction may be made at the time of preparing jelly or during the season when oranges are being most liberally used and packed for later use. As pectin deteriorates in long boiling, and when in contact with acids of fruit juices, it should be added during the latter stages of the process of jelly making. This is facilitated by heating the pectin before adding it. A deficiency of acid may be overcome by the addition of tartaric or citric acid to the juice. This may be obtained in crystalline form. One level teaspoon to a quart of juice is usually sufficient. However, this depends upon the acidity of the fruit. To test, stir the juice until all acid crystals are dissolved, then taste the juice. It should be about as acid as good tart apples.

Peach and pear juice may be made to jell by such an addition, but their delicate flavor is somewhat impaired. The flavor of jelly made from sweet apples and quince is improved by the addition of the acid. Rhubarb juice added to any fruit juice will bring out the flavor and add "snap" to the jelly.
JELLY MAKING PROCESS

EXTRACTION OF JUICE

Heating is necessary in order to extract the pectin from the fruit. The amount of water used depends upon the juiciness of the fruit. The smallest amount of water possible should be used.

After the fruit is thoroughly heated with the water, it should be crushed and cooked until all juice is extracted. It may then be strained through moistened double cheese-cloth or flannel bags. As all of the juice is not obtained by the first extraction a second and third extraction may be made by the addition of water to the pulp and further cooking. The pectin test just given will show when the extracting has been carried far enough.

AMOUNT OF SUGAR

The theory (which has been disproved) that sugar caused the juice to jell, led many to use too large proportions of sugar to juice. Directions usually called for equal amounts of sugar and juice, irrespective of the type of juice. The amount of sugar should be based upon the amount of pectin in the juice rather than on the amount of juice.

A large proportion of sugar may be used with those fruits which contain a large amount of pectin, and for those in which only a small amount of water is used in order to extract the juice. In such cases, the use of too small an amount of sugar results in a tough jelly. When water has been used in extracting the juice or when the pectin content is not especially high (as in some berries) the proportion of three-fourths as much sugar as juice gives good results.

The juice from a second and third extraction has a relatively high proportion of water and small amount of pectin. Therefore, a smaller proportion of sugar should be used. The proportion may fall as low as one-eighth as much sugar as juice. Because of the great variation, it is difficult to lay down rules and give definite proportions.

If the proportion of sugar is correct, it will show in the character of the resulting jelly. Rough jelly indicates too little sugar, and a soft sticky jelly (providing both pectin and acid are present) indicates too large a proportion sugar. Imperfect jelly due to a wrong proportion of sugar or juice may be corrected by cooking a second time, adding more juice or more sugar as the case requires. Care in determining the correct proportion in the first place should be taken as cooking the pectin too long in the presence of the acid may destroy its jellying properties.

TIME OF COOKING

A definite concentration of juice and sugar is necessary before jelly will be formed. The cooking time necessary for such concentration ranges from eight to thirty minutes. The larger the proportion of sugar to juice, the sooner such concentration is reached. Here as elsewhere the most accurate test is to note the temperature by means of a thermometer. The bulb of the thermometer is suspended in the
boiling liquid. The jelly is done when it registers 103° Centigrade or 217° Fahrenheit.

(Note) Care should be taken that the bulb does not touch the bottom of the vessel, for in such a case the temperature would be that of the metal and not the juice.

There are of course many other tests, the accuracy of which depends upon experience and the development of judgment in the individual. One test is "that point at which the boiling mass 'jells', shuts off or breaks off as a portion of it is allowed to drop from the stirring spoon.

Another test is made by pouring a small amount on a cold plate. If it congeals quickly the proper point has been reached.

Some place a drop of liquid on the forefinger, press the finger and thumb together, and then slowly separate. The jellying point is indicated if a thread is formed.

PROCESS OF MAKING

The detail of the process may be most briefly given by taking up a typical example, such as jelly and describing the process of its preparation.

APPLE JELLY

Wash apples thoroughly, cut into small pieces using the skin and cores. Add the smallest amount of water possible and cook until the apples are well softened.

As the pectin is more abundant just beneath the skin and around the core, such refuse portions should be used for jelly making. Cooking is necessary to extract the pectin. After the fruit is thoroughly softened, it should be poured into a bag to drain. In a pointed bag, the draining is facilitated by the pressure of the pulp into the point. Bags made of heavy material (such as flannel) give a clearer juice, but take longer to drain. The squeezing of the bag gives a greater return in juice but makes the resulting jelly cloudy. The juice that is squeezed might be cooked separately or used for butters, etc. Each individual must decide whether she is willing to sacrifice amount for appearance or invest the extra time.

As all the jelly making portion is not extracted by the first cooking, a small amount of water may now be added and the pulp recooked. This second portion is apt to lack flavor. A juice may be added which although possessing good flavor will not jell, such as peach, cherry or strawberry.

After the juice is drained it should be measured and put to cook again in a clean vessel. Let it boil up and then skim. Sugar may be heated in the oven if the watching which is necessary to avoid burning is not considered too much trouble. The only advantage in this is when cold sugar is added, the boiling is temporarily stopped, thus slightly increasing the necessary cooking time. The longer cooking period has a tendency to produce a darker jelly. Skim again if necessary.

Cook until it will jell. Pour into clean sterilized glasses—these should have been left in the boiling water until needed.
Sometimes jelly is strained through a cloth into the glasses. This produces a clearer product, but the added labor and risk of loss through slow action is usually greater than the value of any gain in clearness would warrant.

Jelly may be covered in a number of different ways, all equally good. The object is to protect from molds, insects and dust, as well as to prevent drying out or absorption of moisture. The jelly may be brushed with alcohol and covered with paraffin. Do not have the paraffin smoking hot. Use when it is just warm enough to pour. As the first coat on cooling has a tendency to shrink from the side of the jar, a second coat should be added to cover this. A tin cover should be used when possible, otherwise a paper may be pasted over the top. Careful labeling eliminates future trouble.

A small vessel used exclusively for melting paraffin is very handy, one that will fit into the top of the teakettle being especially convenient. The same paraffin may be used for several years by washing and saving the covers as they are removed from the jelly. Paraffin is difficult to remove entirely from a vessel in which it has been melted. A good plan in such a case is to fill the vessel brimming full of boiling water and allow it to stand undisturbed until cool. All the paraffin will be found solidified on the top and may be removed and saved.

The process of jelly making does not vary, all kinds being made in the same way. Numberless varieties may be made by blending flavors. The ripeness of a fruit often determines the characteristics of the resulting jelly. For example, Concord grapes when picked while green give a jelly very different in color and flavor from that made from the riper grapes.

**CANNING FRUIT JUICE FOR JELLY**

The unsweetened fruit juice may be canned during the fruit season and the jelly made at a more convenient time. This plan has several advantages.

1. Most fruits are available at the hottest and busiest time of year, at a time when the out-of-door is most beautiful. There are many "shut-in" days during the winter which are more suitable for jelly making.

2. Storage space is another big consideration. Much fruit may be stored in half gallon or gallon cans, while the glasses take a large amount of storage space.

3. A larger range of flavors is possible, as fruits which ripen at widely different seasons may be combined. The juice left from canning and preserving may be saved and utilized for jelly.

4. A surplus of fruit may be canned in times of large crops. This may serve to tide over years of crop failures.

**PRESERVES, JAMS, MARMALADES**

It is desirable that all terms be standardized. This is especially true in the case of such terms as preserves, jams, marmalades, etc. Much confusion has resulted from the fact that these terms have not always been given the same interpretation. To one woman, all
combinations of fruit go under the name of jams, while another
woman would call them all preserves. Frequently, when a recipe is
given, practically no two women have the same understanding of it.

PRESERVES

This name has been commonly given to the produce made by
cooking together definite quantities of fruit and sugar (usually equal
parts by measure) to a point where it will keep without being sealed
air-tight. In preserves, we aim to keep as nearly as possible the
original shape and appearance of the fruit. Thus we can distinguish
two essentially different parts, the fruit and the juice.

JAMS

As a rule, only the small fruits of which the whole may be used
are utilized in jam making. Here the fruit is crushed in the juice
so as to produce a homogeneous mixture.

BUTTERS

These are more smooth and more mixed than jams. For this
purpose fruits which contain a large proportion of fleshy material
are used. Butters are further characterized by the frequent use of
spices and other flavoring agents.

MARMALADE

This product stands midway between jams and butters. Larger
fruits than those used in jams are used. Fruits whose pulp will not
produce the smooth consistency desirable in a butter are used in
marmalade making. By slight differences in preparation, the same
fruit may make either a marmalade or a butter. For example, if
peaches are cooked until soft before adding the sugar, the resulting
consistency is that of a butter. If the sugar is added at the beginning
of the operation, the pulp is preserved in small pieces rather than
being reduced to a smooth paste. This results in a marmalade.

PROPORTIONS

Practically the same amounts of sugar are used in all of the
above products. In common practice, equal measures of fruit and
sugar are used. It has been found, however, that a better consistency
and a more delicate and characteristic flavor is produced when less
sugar is used. Three-fourths as much sugar, by weight, as fruit,
have been found sufficient to keep the fruit, when it is cooked to the
proper concentration. When less sugar is used, the product, which
approaches canned goods in consistency, will not keep unless sealed
air-tight. Preserves should be sealed to prevent the absorption of
moisture.

UNDERLYING PRINCIPLES

Where the aim is to retain the shape of fruit, it should be cooked
from the beginning in the sugar syrup as this has a tendency to
harden the flesh and thus retain the shape.

Where a fruit has a large amount of fiber or when it is to be
mashed, the fruit should be cooked until tender before adding the
sugar. This is unnecessary in the case of small fruits.

A desirable consistency in a marmalade may be produced by the addition of pectin. This does not affect the flavor.

**STRAWBERRY PRESERVES**

Strawberries make a better preserve than canned product. The berries are cleaned and hulled. The syrup heated until the top is covered with a slow moving mass of bubbles. The berries are then dropped in, cooked until they cease turning over or sinking to the bottom. Allow to stand for twenty-four hours; draw off the excess juice. Pack in sterilized jars. Cover with paraffin.

Proportion: — 1 lbs. sugar to ¾ pint of water to 2 quarts of berries.

Note: — The excess juice which will be about 1½ pints, may be used for jelly making.

**ORANGE MARMALADE**

- 3 large oranges
- 3 lemons

Cut off tops and bottoms, slice remaining fruit very thin and cut into fine pieces or run through food-grinder. Add twelve cups cold water and let stand twenty-four hours. Simmer one hour and let stand twenty-four hours. Bring to a boil and add nine cups sugar. Cook slowly fifteen to twenty minutes.

**PICKLES**

In pickles the preservation is effected by the use of vinegar and spice. This means that the strength of the vinegar must be sufficient to exert a preservative action. Also that it must be sufficient in amount to cover the material pickled. In the case of sweet fruit pickling, the aim should be to retain as much of the flavor of the fruit as possible. The only function of the juice is to serve as a flavor medium and source of flavor for the pickled fruit.

There are three main classes of pickles; sweet fruit or vegetable pickles; sour pickles, which include mustard pickles; and that large variety of pickles in which the material is chopped finely.

Although many varied recipes may be found for each class, one formula can be used to make a large variety. A large number of recipes that seem very different may be reduced to the following formulae.

The following abbreviations are used:

- t. teaspoon
- T. tablespoon
- c. cup
- oz. ounce
- lb. pound
- gal. gallon
- pt. pint
- qt. quart

**FORMULA FOR SWEET PICKLES**

- 2 lbs. prepared fruit or vegetables
- 1 oz. mixed spices
- sugar
- vinegar

The kind of fruit or vegetables and the way it is prepared determines the kind of pickle which results. For example:

Sweet Peach Pickle: — Scald the peaches to remove the skin. If the peach is hard, cook until tender (steaming is the best method). Prepare the vinegar according to the above formula and cook the peach in it until it is transparent.
SWEET PEAR PICKLE:—Peel the pears and proceed as above.

CRABAPPLE PICKLES:—Crabapples need not be peeled. If they are pickled the spiced vinegar can find entrance and flavors the pickle. The pickle is made in the same way as the peach or pear.

SLICED TOMATO PICKLES:—Green tomatoes may be sliced and a sweet pickle made according to the above rules. However most people prefer the green tomatoes when sliced and mixed with sliced onions and a sour spiced vinegar added.

WATERMELON PICKLES:—Watermelon rind makes a very good pickle. Trim off all of the red and green parts, cut in suitable pieces, and put the rind to cook in salted water (1/2 t. to 1 qt.). Cook until it becomes translucent. Drain water off. Cook for one-half hour in sweetened vinegar, using 3 pints of brown sugar to one quart of vinegar. One cup of mixed spices may be put in a cheesecloth bag and added to the vinegar if the spiced flavor is desired.

MUSTARD PICKLES

1/4 to 1/2 c. sugar
1 oz. ground mustard
2 T. flour

Mix and stir into one pint of hot vinegar and cook until it thickens. Tumeric may be added to give color. Pour while hot over one quart of mixed vegetables from which the water has been extracted by the brine treatment.

Reference, Anna Barrows, "Course in the Use and Preparation of Vegetable Foods"; United States Department of Agriculture, Office of Experiment Stations, Bulletin No. 245, p. 89.

SPICED VINEGAR FOR SOUR PICKLES

1 gal. vinegar
4 red peppers
2 sticks of cinnamon
2 T. allspice berries
2 T. cloves

If the spices are tied up in cheesecloth bags the amount of flavor can be better regulated, as they can be easily removed at any time. This also improves the appearance of the pickle.


NEBAS PICKLE

1 gal. cider vinegar
1 lb. salt
1 oz. whole cloves
1 oz. turmeric
2 oz. whole allspice
1 oz. whole black pepper
1 t. chile peppers
1/2 lb. ground mustard

Mix the mustard and turmeric in a little vinegar. Bring remaining ingredients to a boil and add mustard and turmeric. Boil five minutes. When cold add little cucumbers, onions, beans and cauliflower. Last three vegetables should be cooked a little, but cucumbers are merely cleaned. Vegetables may be added as secured from garden, a quart or two at a time. Each time a fresh lot is added, stir mixture thoroughly from bottom. Keep well covered in a cool place and pickles will be good for a year.
PICKLE LILY

1 pk. green tomatoes
2 qts. onions
2 or 3 green or red peppers

Chop all fine. Separate and mix, adding two cups of salt. Let
stand over night and in the morning drain well. Add half pound
of mustard seed and one cup of grated horseradish. Put in a cloth
bag two tablespoons of ground allspice, two tablespoons of ground
egves, let boil with three quarts of vinegar, pour over all. Put
away in Mason jars. Celery can be used in place of onions and
cabbage added with all.

CHOPPED PICKLES

These may be made in numberless mixtures, the materials most
used are tomatoes, both green and ripe, cabbage, onions, celery,
cauliflower. These may be cooked with the vinegar and spices as
in the making of Chili Sauce or they may be left raw as in the ease
of Pickle Lily. The kinds and amounts in the various mixtures is a
matter of personal preference.

DIXIE RELISH

1 qt. chopped cabbage
1 pt. chopped white onion
1 pt. chopped sweet red pepper
1 pt. chopped green pepper

4 T. mustard seed
2 T. celery seed crushed
% c. sugar
1 qt. vinegar
5 T. salt

Soak pepper in brine (1 c. salt to 1 gal. water) for 24 hours.
Freshen in clear cold water for one or more hours. Drain well.
Remove seeds and coarse white sections. Chop separately and measure
the chopped cabbage, peppers and onions before mixing. Add spices,
sugar and vinegar. Let stand over night in crock or enameled vessel.
Pack in small jars and sterilize ten minutes.

CHUTNEY SAUCE

2 pts. chopped apples
1 pt. chopped ripe tomatoes
1 lb. chopped raisins
4 chopped small onions

8 T. mint
1 doz. small peppers
1 lb. sugar
1 T. mustard

Mixed thoroughly and poured over all scalding vinegar. Let stand
three or four weeks before using.

PEPPER RELISH

12 red peppers
12 green peppers
12 medium onions

Chop or grind all. Mix thoroughly. Cover with boiling water and
let stand five minutes. Drain. Add 1 pint vinegar, 2 cups sugar,
3 tablespoons salt. Boil five minutes and put in sterile cans.

RIPE TOMATO RELISH

8 qts. ripe tomatoes
6 large onions
2 c. celery
3 green peppers
Grind, mix thoroughly and drain. Add
2 c. brown sugar  1/2 c. salt
2 T. mustard seed  1 qt. vinegar

Put in jars and seal. Do not cook.

**CHILI SAUCE**

Take two quarts of ripe tomatoes, four large onions, four peppers, chop them fine, then add four cups of vinegar and the following:
3 T. brown sugar  2 t. cinnamon
2 T. salt  2 t. ginger
2 t. cloves  1 t. allspice
2 t. nutmeg

Boil together until quite thick, then bottle for use.

**APPENDIX**

The following score cards are of interest as they show the means employed to effect the standardization of canned and preserved products.

**SCORE AND PLACING CARD FOR CANNED GOODS**

<table>
<thead>
<tr>
<th>General Appearance:</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Shape</td>
<td>10</td>
</tr>
<tr>
<td>Color</td>
<td>10</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Solid Portion:</th>
<th>Liquid Portion:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Proportion</td>
<td>Proportion</td>
</tr>
<tr>
<td>Flavor</td>
<td>Flavor</td>
</tr>
<tr>
<td>Condition</td>
<td>Condition</td>
</tr>
<tr>
<td>----------------</td>
<td>-----------------</td>
</tr>
<tr>
<td>15</td>
<td>15</td>
</tr>
<tr>
<td>15</td>
<td>15</td>
</tr>
<tr>
<td>10</td>
<td>10</td>
</tr>
<tr>
<td>Total</td>
<td>100</td>
</tr>
</tbody>
</table>

**Explanation of Values**

General Appearance:—Color of natural fruit or vegetable. Uniformity of shape and size.

Proportion:—As large a proportion of solid material to liquid as possible. Do not can a large amount of water.

Flavor:—The natural flavor should be preserved as far as possible. In fruit the syrup should not be too thick, and vegetables should not taste strongly of salt, vinegar, etc.

Condition:—Material should not be cooked to pieces and should otherwise be in good condition.

Preserves:—In preserves there are two distinct parts, fruit and syrup. Fruit should retain shape, be clear in color and syrup thick, clear color, small proportion to fruit.

Jams and Butters:—The points given under liquid should be applied to solids because in both cases the liquid is well blended with the solid so as to form a soft moist paste-like mass.

Marmalades:—In marmalades, part of the peel or skin may be left in and there are distinguishable two distinct portions, clear juice and the particles of the fruit.

Pickles:—Fruit or vegetables should be firm, not flabby; uniform size and shape, good color. Amount should be large in proportion to liquid; appetizing in appearance. In case of mixed pickles, the choice in proportion of mixture should be good. In sweet pickles, fruit should retain the flavor of the fruit. The juices should only serve as a source of flavor or flavor medium for the pickled fruit.

Relishes:—Includes all finely ground pickles. Pieces should be of small but uniform size, not like pulp.
SCORE CARD FOR JELLY

General Appearance ........................................... 30
Color ............................................................. 10
Clearness .......................................................... 10
Crystals (lack of) ................................................ 10

Taste ............................................................... 25
Consistency ......................................................... 35
Covering ........................................................... 10

Total ............................................................... 100

Explanation of Values

Color:—Should have color of predominating fruit.
Clearness:—Not cloudy or containing sediment.
Taste:—Should have natural flavor.
Consistency:—Holds shape, tender, will cut easily, firm angles retain shape.
Crystals:—Should have no signs of crystallization.
Covering:—Should give adequate protection from contamination.

CLASSIFICATION OF VEGETABLES

Classified According to Their Richness in Various Mineral Constituents—(Sherman)

IRON
(Used for building red corpuscles of blood.)

1. Spinach
2. Lettuce
3. Asparagus
4. Beans (String)
5. Cabbage
6. Celery
7. Radishes

8. Beans (dried)
9. Beans (Lima)
10. Squash
11. Tomatoes
12. Carrots
13. Turnips
14. Onions

POTASSIUM
(Used in cell building)

1. Spinach
2. Lettuce
3. Celery
4. Tomatoes
5. Cabbage
6. Parsnips
7. Mushrooms
8. Turnips
9. Green corn
10. Beets
11. Asparagus
12. Cauliflower
13. Carrots
14. String beans
15. Potatoes
16. Radishes
17. Onions

MAGNESIUM
(Helps in nerve building)

1. Spinach
2. Celery
3. Parsnips
4. Beans (string)
5. Asparagus
6. Cucumbers
7. Beans (Lima)
8. Cabbage
9. Carrots
10. Tomatoes
11. Beans (dried)
12. Beets
13. Turnips
14. Radishes
15. Peas (dried)
16. Onions
17. Cauliflower
18. Peas (fresh)
19. Lettuce
LIST OF PUBLICATIONS

The following list of pamphlets issued by the States Relation Service, Office of Extension Work, North and West, will be found to be especially helpful. They may be obtained free by addressing that Department at Washington, D. C.

Form NR 33   Methods and Devices.
Form NR 24   Home Canning Club Instructions to Save Fruit and Vegetable Waste.
Form NR 25   Additional Recipes, Tested and Determined for Use in the Boys' and Girls Home Canning Club Work.
Form NR 26   Home Canning Club Instructions—Canning of Soups.
Form NR 23   Canning Windfall and Cull Apples and Use of By-Products.