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VOLUME 15 NUMBER 7

EXTENSION SERIES 6

The Preservation of Food in the Home

BY

LOUISE STANLEY, Ph. D.

Assistant Professor of Home Economics,

AND

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UNIVERSITY OF MISSOURI
COLUMBIA, MISSOURI
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Preservation of Food in the Home

INTRODUCTION

In the household we still work according to rule without knowing the reasons why. Our cooking rules are called recipes. In these we have stated in many cases numerous unnecessary steps and we frequently find very inaccurate statements. The aim of this bulletin is to explain the reasons for the various steps as they are given in some typical recipes for the preservation of food. It is hoped that the explanations given will be sufficient to enable every woman to make better use of the numerous recipes she has already at hand.

Why Foods Spoil. We know that foods spoil for two reasons.

1. The most important reason is that there are present all about us tiny plants too small for us to see, which we call micro-organisms. These micro-organisms like the same food we like—meat, bread, vegetables. Most of our plants are green in color and can manufacture from the air and water and soil the food which they need. These plants, micro-organisms, which are so small and so numerous, cannot do this. You might call them lazy little beasts only they are plants and not animals. They prefer to live on our food, and in the process of helping themselves, they in most cases render the food unfit for our use. In order to keep our food sweet and clean, then, we must kill any of these plants that may have got into it before it comes to us; and we must prevent any others from getting in; or else we must keep it under such conditions that any which may be present cannot thrive and bring about their destructive work.

2. The second reason for the spoiling of foods is not so easy to explain. We know that there is a great difference in the ripening of all fruits and vegetables. For example, an apple, a peach, and a quince all ripen differently. During the time that they are growing the same sun is shining upon them and they enjoy the same rainfall. There must be some individual differences which cause the variations in ripening.

The material in the fruit or vegetable which causes the ripening so characteristic of the different kinds is called by the scientist an enzyme. These enzymes aided by the heat of the sun bring about certain typical changes in the fruit or vegetable which we call ripening. It is well known that if these changes continue too long the fruit deteriorates in quality and finally becomes unfit for use. We also know that such changes continue after the fruit has been gathered.

These ripening changes, especially those which occur after the gathering of the fruit, take place with varying rapidity in the different kinds of fruits and vegetables. The possibility of storing any vegetable material depends upon the rapidity of this change. Apples may be stored because

this change is slow. Peaches ripen rapidly and on this account cannot be stored for any length of time.

Why Fruit and Vegetables Become Stale. In the household we are not concerned with enzymes in the ordinary methods of preserving foods because the heating necessary to kill the micro-organisms destroys the enzymes also. We are concerned with them, however, when we gather fruit or vegetables for immediate use for we know that the flavor of stale vegetables is due to changes brought about by these enzymes.

Fresh corn on standing becomes less sweet. This is due to the fact that the sugar present when the corn is first gathered is being continually changed by the enzymes to a less sweet material, starch, until this action is stopped by cooking which kills the enzymes. This same change takes place before the corn is gathered, only in this case there is continually a fresh supply of sugar unless the corn is too old, when we know it also lacks its sweet flavor. Similar changes take place in other vegetables, but in most cases it is less noticeable because the differences in flavor are less pronounced.

The delicate flavors of fruits such as strawberries are destroyed by allowing them to stand after they have been gathered. This fact is well demonstrated by the difference in flavor of the berries eaten just off the vine and those which have stood for two or three days in the city market. Therefore, if we wish to preserve the delicacy of flavor in either fruits or vegetables we must can them as soon after gathering as possible, in any case, the same day,

In order to set to work on the problem of food preservation with an idea of finding out the reasons for the various steps involved, we must first know something more about the two causes of decay, the micro-organisms and the enzymes, the conditions under which they live, how they may be destroyed or their action stopped. All this is taken up in detail by the scientist in the study called bacteriology. We can only touch upon it most briefly here.

The Presence of Air Does not Cause Food to Spoil. The old idea which is still believed in many places that air causes the decay of food material and that the exclusion of this air in some way helps to keep the food is incorrect. The bacteriologist has found out that if he heats the air before introducing it into food materials it no longer causes them to spoil. From this we know that the air itself does not in any way cause the spoiling. We must keep out the air, however, because there is present in this air large numbers of micro-organisms. For this reason when we are filling cans or jars with fruit cooked outside the can, we fill the can full so as to exclude all air, because we know this air contains some harmful micro-organisms. On the other hand, when the fruit or vegetable is to be cooked in the can we need not worry about the air space because this air will be heated at the same time the fruit is and the micro-organisms in it will be killed in the same way as those which are contained in

the food material itself. Practically, however, whether we cook our fruit outside the can or in the can we know that it is poor economy to leave an air space where we might have fruit.

How Micro-Organisms Get Into Our Food. Since we know that our fruits spoil on account of micro-organisms, bacteria, yeast, and mould, and that these small plants are not only present in the air but also in dust, soil and water, and since air comes in contact with all the utensils and materials we are using, we realize how very careful we must be to keep these little pests out of our foods.

Conditions Under Which Micro-Organisms Grow. In order to preserve our foods to the best advantage we must know how these bacteria, yeasts, and moulds live. We must know the conditions under which they grow and develop best, we must know the means by which they may be killed or their action stopped. Further than this the housewife must know how to do this with the facilities to be found in the ordinary kitchen.

1. Micro-organisms must have foods similar to our own. They are quite fond of meat, as we know by the readiness with which they destroy it. Some of them like sugar but they cannot live on sugar alone any more than we can. The different kinds are quite like people, having individual preferences. In general, however, it will be found that in order for them to thrive well they must have a balanced ration.

2. They must have something to drink—water. We know that while fresh fruits deteriorate quite rapidly, if we dry these fruits or put them in the sun until the amount of water present is considerably diminished, then the bacteria cannot destroy them. The scientist tells us definitely that the amount of water necessary is 30 per cent.

3. They must have favorable temperature conditions. They live best at a temperature about the same as that of our own bodies. If this temperature is considerably lowered, while they continue to live, they will not develop. We know that ice may contain bacteria and on this account, unless we are very sure of the source of our ice, we must be very careful not to put it directly into water which we intend to drink. If on the other hand, the temperature is increased beyond a certain point, these organisms are destroyed.

Temperature at Which Micro-Organisms are Killed. The temperature at which micro-organisms are killed varies with the different kinds. All that are actually growing are killed by boiling. It is well to have in mind just what temperature this represents. If a thermometer is inserted in boiling water, it will register 212° Fahrenheit, or 100° Centigrade.

There are a few, however, that are able to go over into a more resistant form which the bacteriologist calls a spore. Spores are not killed by boiling water unless the boiling is continued for some time. They can be killed by heating to a temperature higher than boiling, or if left after boiling under favorable conditions for 24 hours, they will develop into an active form and then may be killed by simple boiling. This is the scien-

tific reason for a well-known, popular method of canning such vegetables as corn, beans, and peas in which the material is heated for three successive days.

Methods of Food Preservation. There is no phase of the conservation of food in the country home that is of greater importance than that which has to do with its preservation. The methods of food preservation now in use may be conveniently classified under five heads:

1. Harmful chemical preservatives
2. Low temperature
3. Drying
4. Heat
5. Harmless chemical preservatives

Harmful Chemical Preservatives—So-Called Preserving Powders. Chemical preservatives act in various ways to prevent the growth of bacteria. While some are known to be harmless, and others are known to be harmful, there is a large group about which we are undecided—sodium benzoate, sodium sulphite and boracic acid. These have been the subjects of a great deal of discussion the last few years. Most scientists have now concluded that the majority of them are harmful, at least in the hands of the inexperienced. While we cannot prove this specifically in many cases, we have decided that so long as there is a doubt they should not be used in our foods.

A further objection to their use is that they make it possible to preserve food which is about to spoil and may be in an unwholesome and unsanitary condition.

As a rule, such preservatives have played but a small part in the home preservation of fruits, and the pure food officials are gradually controlling by different means their use in the factories. While some do admit that their use commercially is permissible, they are much more harmful in the hands of the house-wife who does not know just what a particular material is or the dangers which are present in its use.

The factory canner knows what he is using; knows just how much he can use; and can determine that amount accurately. The housewife does not know which of a given list of chemicals is sold to her under the name of preserving powder; she does not know how much she should use, nor is she able to measure it very accurately. Such chemicals are on the market under the name of preserving powders and the unsuspecting housewives buy them, little realizing that they are purchasing in a concentrated form the material which is partially responsible for the feeling which we have toward the factory canned goods. In any case, it is only a substitute for careful, intelligent work, and will not accomplish anything which cannot be gained by the latter.

Preservation by Means of Low Temperature. Low temperature is of great commercial importance. The making of artificial ice and artificial refrigeration have done more than any other one thing to make possi-

ble a better distribution of food products. It is used in the home, but is of sufficient importance for another bulletin.

Preservation by Means of Drying. Since the development of other methods, drying is not as much used as formerly. It is based upon the fact stated above that when the amount of water in any material is reduced below one-third the bacteria no longer find conditions favorable for development. It has been almost entirely replaced by methods to be considered next. This is not in all cases an advantage because in the dried materials the flavor is frequently preserved to a greater extent, and the bulk is appreciably reduced without any loss of food value. It also is a question worthy of separate consideration so will not be taken up here.

Preservation by Means of Heat. This method of preservation of foods is by far the most important and in combination with the use of harmless chemical preservatives, such as sugar, spice and vinegar, goes to make up the chief method of food preservation in the home.

We shall now discuss as simply as possible the few principles which are the basis of food preservation by heat, and show how they may be applied in some typical recipes. The recipes and directions at present available are without number and what is now needed is to get at the important points in each and leave out the unnecessary steps. We can only do this by having a definite idea of what our object is and the best ways of accomplishing it.

In this day and time when there is so much to be done in the farm home, the farm woman will eventually refuse to worry with the details of canning and preserving unless we can show her how they can be done with less expenditure of time and energy. That this is not always done can be illustrated by a quotation from the preface of a popular recipe book on canning and preserving: "While the recipes contained herein are as simply and explicitly described as possible, to insure perfect success time must not be considered and the greatest care taken."

The woman of today must consider her time, especially when recipes call for such a useless expenditure of it. Good examples of this can be taken from the same book quoted above. We are not surprised to hear this author advocate the making of blackberry preserves according to the following rule:

"Spread them out separately on flat dishes, sprinkle with the sugar, and stand aside for one hour; then put them in porcelain lined vessel with all the juice that may have exuded; stand kettle over the fire until the berries are slightly heated, then take them out *one by one* with a spoon and spread them on the same flat dish." . . . And for cherry preserves, ". . . lift carefully *each cherry with a teaspoon* and put into tumblers or jars and stand aside to cool."

The above methods may be used by the woman who has more time at her disposal than she knows what to do with. The country woman probably makes better preserves with less expenditure of time and energy.

Still she is in many cases questioning whether the time necessary cannot be further decreased and is asking for help, especially along that most difficult line of all, vegetable canning.

Realizing the importance of this work in the farm home and realizing that much material was being wasted on the farm, because the methods had not been carefully worked out, the United States Department of Agriculture sent an expert to study factory methods of canning and to adapt such methods to use under home conditions.

A summary of this investigation may be found in *Farmers' Bulletin* 521, issued by the United States Department of Agriculture. The success of the canning work done by the girls' canning clubs of the country for the last three years has demonstrated beyond the shadow of a doubt that the methods or processes outlined by the canning clubs directors are applicable to any home conditions and can be carried out by even young children.

Names of Food Preserved by Heat and Sugar. One other point where we have failed in working out our methods systematically is in having definite standards toward which to work. There is too little understanding of the meaning of various names applied to food products, especially to those in which sugar is used. Indefiniteness in the use of terms is illustrated by comparing recipes for materials called by the same names in the different recipe books.

An effort has been made to systematize the chief points in such recipes in the same way that the men have systematized their stock judging and corn judging work, that is, by making score cards for each of the distinct products. On these score cards the essential characteristics of the different products are listed and a definite value is assigned to each.

It is hoped that such systematization will help both in bringing about more uniform products and in forwarding the educational work which has the preservation of food as its basis. When exhibits of such materials are judged the score may be marked on each can so the contestant will know wherein she has failed.

CANNING

Canning will be considered first because we are concerned simply with the use of heat in killing micro-organisms and the subsequent prevention of the entrance of others. What we desire in the canned product is to have the flavor of the fruit or vegetable as nearly as possible like that of the fresh fruit. We cannot have the same flavor, since heating always changes the flavor to a certain extent, and the heating is necessary to kill the organisms and any enzymes present. Underripe fruit or vegetables, or those that have been kept too long after gathering, cannot be expected to taste well after canning. The best rule is not to can any material which you would not be able to serve on your own table immediately. All green vegetables, such as peas, corn, etc., should be taken early before they lose the sweet taste, that is, before the sugar is changed to starch.

We should also remember that if vegetables are kept too long after being gathered, the change from sugar to starch may be brought about by means of the enzymes present.

MATERIALS NEEDED

A. Fruit or vegetable to be canned.

B. Sugar will be needed in canning fruit. The sugar should be pure and white. We have no difficulty now in obtaining pure, unadulterated sugar. Because of the former practice of adulterating loose sugar, many older English recipes call for loaf sugar, which was at one time the more pure form. One of the writers was much surprised, on going into a kitchen at Christ College, Oxford, England, to find the cook there, a "mere man," with a hammer pounding up loaf sugar for use in making marmalade, because the recipe called for it, in that form. An illustration of such recipes is the following quotation from a marmalade recipe in an English book on preserving. ". . . only the best materials should be used, for example, Seville oranges and lump sugar."

C. Salt will be needed for the vegetables. Any pure coarse salt is perfectly satisfactory. Prepared table salt usually contains some other material which may prove objectionable.

UTENSILS NEEDED

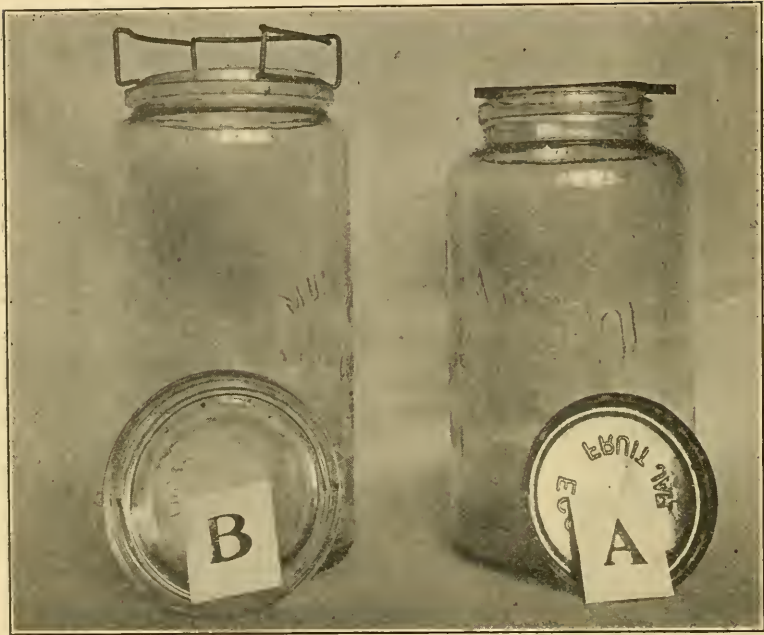
A. **Cans or Jars.** Tin cans are cheaper but since most of them can be used only one year, glass jars are more satisfactory and often less expensive in the end, though they cost more at first. In case the canned material is to be sold, tin cans will be more satisfactory because they can be more readily packed and shipped.

1. **Characteristics of a Good Glass Jar.** A good jar must be capable of keeping out air. No metal should come in contact with the contents. The top or the part of the top which comes in contact with the material in the jar should be all in one piece, so as to offer no place for the accumulation of dirt, etc. The sides of the jar should be as nearly straight as possible so that the vegetables can be put in whole or in large pieces. Such a jar is easier to clean.

2. **Different Types of Jars.** No effort will be made here to defend the advantages and disadvantages of the different types of jars. Probably the best is the one with a glass top, held down by a metal spring arrangement.

3. **Selection of Jars.** Jars should be carefully selected, making sure that the edges are smooth. They should be tested before being used to be sure they are air-tight. To test them, fill the jar with water, adjust top and rubber, invert, and if no water escapes the jar may be considered air-tight.

4. **Rubbers and Tops.** Much material is wasted by false economy in using imperfect covers and rubbers for the second time. The covers



TWO TYPES OF JARS

A, metal top; B, glass cover with metal clasp, open.

of screw top jars may be kept in good condition for several years, provided proper care is taken in opening the can. The usual custom of loosening the cover with a knife is a bad one in that it frequently destroys the value of the edge as a seal. The better way is to remove the rubber by pulling it out from the edge. This destroys the rubber so there is no further temptation to use it again and at the same time the cover is loosened without being bent.

B. Canners. There are on the market at the present time many different canners most of which are good. For the average home the purchase of a canner probably will pay by the fruit and time that it will save. However, the housewife should consider carefully the merits of the different types of canners in order to decide which best suits her individual needs.

Home-Made Canner. A home-made canner which will do very satisfactory work, can be improvised from utensils to be found in any kitchen. While we appreciate the value of a commercial canner, each homemaker should decide for herself whether the amount of canning she does will justify the investment.



Same as on Page 10, Sealed.



DIFFERENT TYPES OF JARS

A, metal top, vacuum seal; B, glass top, vacuum seal;
C, ordinary screw top.



OPENING A CAN BY REMOVING THE RUBBER

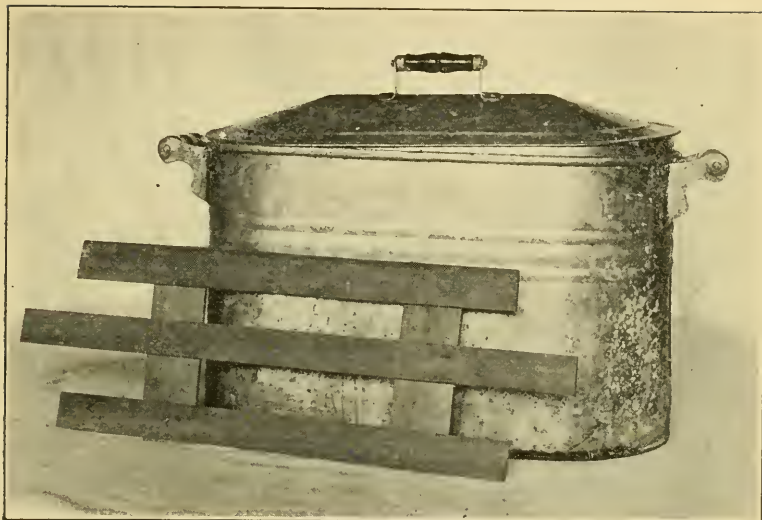
A practical housewife gives the following instructions:

"At a cost of two dollars we have a home-made steaming vessel. It is made of heavy galvanized iron. It is ten inches wide by fourteen and a half inches long and twelve inches deep. It has a perforated false bottom, with short legs to raise it off the bottom of the vessel. On this false bottom the jars are placed to prevent burning or scorching. The cover is close fitting and braced across with strips of the same metal to prevent warping.

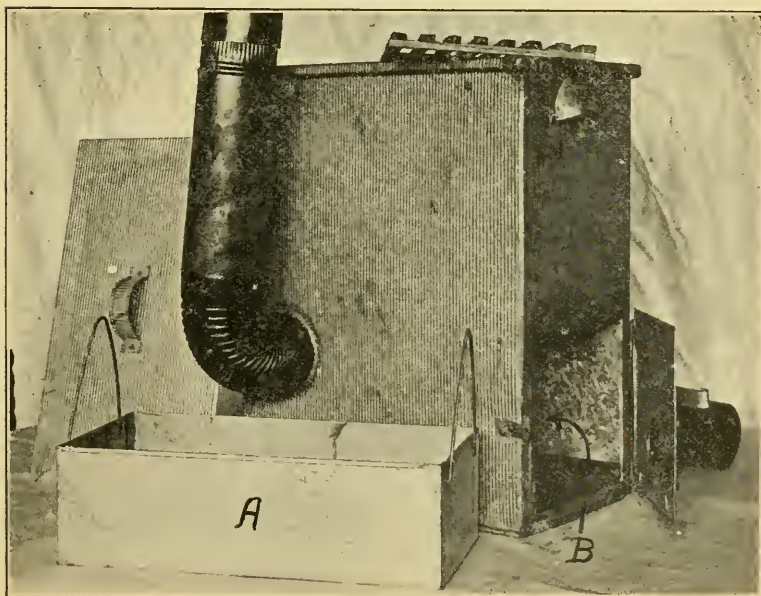
It holds six quart or half-gallon jars and is invaluable and indispensable. In this way we make a kind of wholesale job of canning, and often, for the sake of economy, place the steamer on the kitchen stove while the cook is preparing dinner. Oftentimes we use the coal oil stove to avoid the heat of the cook stove, preparing the vegetables in a cool place, or out on the porch, not touching them until steamed."

1. **Water Bath Canners.** There are three general types of canners on the market. The simplest is known as the water bath. It consists of a containing vessel with a rack and a cover. As the rack has handles to it, it serves not only to keep the jars off the bottom but at the same time as a means of lifting the jars into and from the hot water. There are utensils in every home from which such a canner can be made.

For example, we may use as the container a wash boiler, any type of pail with cover or anything else to which a tight fitting cover can be made. A rack may be made of boards, heavy screen, or tin.



A WATER BATH CANNER IS POSSIBLE IN ANY HOME
Wire handles to the rack make the lifting easier.

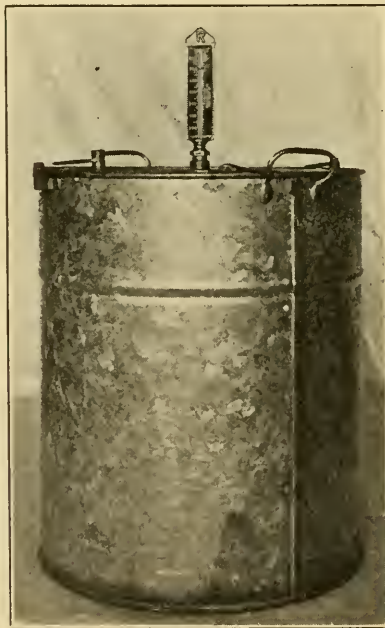


PORTABLE WATER BATH CANNER
A, rack for holding cans; B, fire box with water container above.

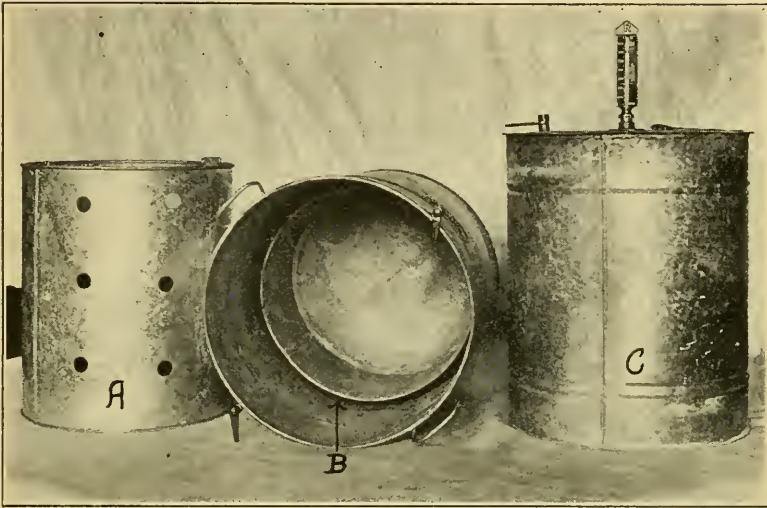
2. **Water-Seal Canners.** The second type is known as a water-seal canner. It is a more complicated apparatus and one in which we are able to obtain a temperature higher than boiling (212° F- 218° F). The high temperature is possible because the top fits down very closely and securely, and because of the triple thickness of the walls as shown in the illustration. The chief advantage of the water-seal type is that the cooking time is shortened. For further details see the accompanying diagram.

3. **Pressure Canner.** The third type of canner is known as the pressure cooker. It is manufactured of various materials, ranging from cast-iron to aluminum, and in various shapes. The distinguishing features are a securely fastened top which makes possible increased temperature and pressure, and a pressure gauge. Most of them also have a thermometer.

C. **Miscellaneous Utensils.** Before beginning to can have conveniently placed a sufficient number of sharp knives, knives which are adapted to the work to be done, and any other utensils which may be needed. There are various devices on the market which are cheap and save much time by making more easy such operations as paring, coring, slicing, etc.

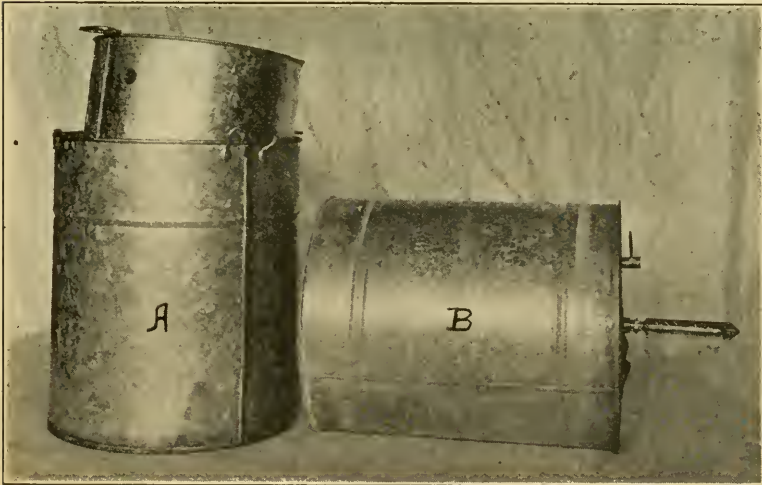


WATER SEAL CANNER, CLOSED
Note thermometer on top.



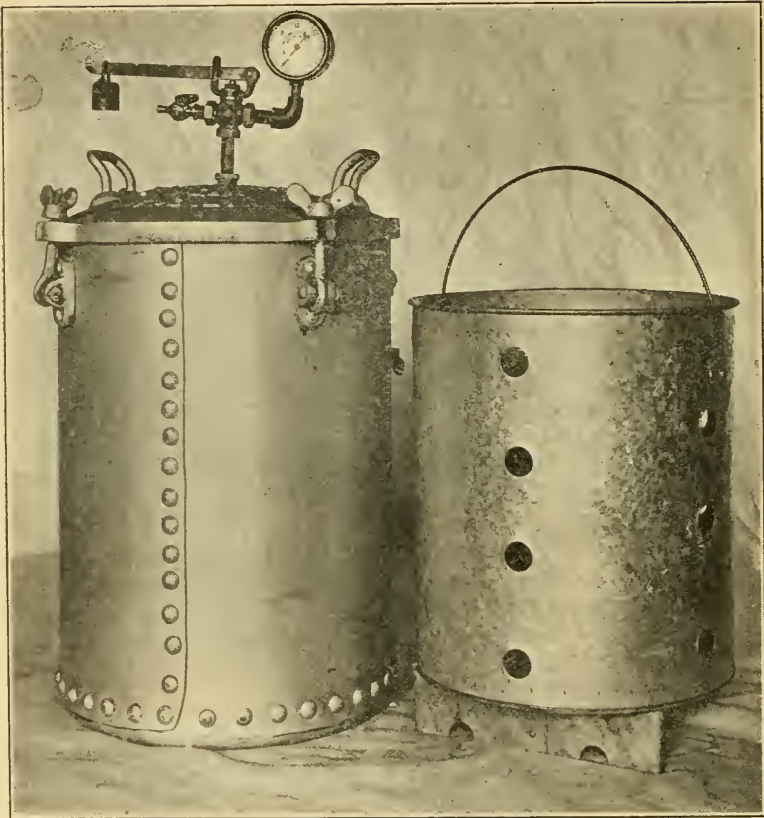
WATER SEAL CANNER, OPEN

A, rack for holding cans; B, container with double walls; C, cover which fits between the double walls of the container. This helps to conserve the heat and a slightly higher temperature is reached than with plain water bath.



ANOTHER VIEW OF THE WATER SEAL CANNER

A, container with rack partly inserted; B, cover.



PRESSURE CANNER

The clamps fastening down the top make a higher pressure and temperature possible.

Before purchasing such devices the same question should be asked as was suggested in the case of the canner. The housewife should be sure that she will use it enough to warrant the investment. Too many utensils are not advisable. A few well chosen, simple utensils take less work to care for and in the end do better service than those which are more complicated. The added trouble of the care and storage of complicated devices in many cases outweighs any added utility they may possess.

PLANNING THE WORK

1. **Time and Place.** Canning would lose a great deal of its drudgery if the operation were thoroughly systematized. It should be planned for a time least likely to be interrupted by other household tasks. Much

nervousness results from the attempt to attend to two different lines of work at the same time and neither is done well.

The air in the room in which the canning is done should be as free as possible from dust. There should be plenty of table space and the tables should be so placed with reference to the stove and water supply as to avoid as much lifting and carrying as possible. In the summer time the work can be done in many cases with less worry and always more pleasantly out-of-doors. This is quite possible with one of the small portable canners or even an oil stove.

2. Sterilizing the Cans. The first step in the operation is sterilizing the cans. They should be carefully washed and may be sterilized in the canner or by boiling in a separate vessel provided for this purpose. In case a vessel without a rack is used, something must be placed in the bottom to hold the jars off it, otherwise the uneven heating will cause them to crack. The water should be cold when the jars are put in and heated slowly.

While sterilization is not absolutely necessary when the fruit is to be cooked in the jars, it is a wise precaution to take and it heats up the jars so that when the work is done quickly there is less danger of breaking them.

3. Length of Time the Various Materials Should be Heated in the Cans. Since different types of micro-organisms live on the different varieties of fruit and vegetables, the time necessary to cook the different ones varies.

Time Table

This table shows the time to be followed in the use of the four different types of portable home canners.

	Size of cans.	Hot-water bath outfits at 212°	Water-seal outfits above 212°	Steam pressure cooker 5 lbs. or more	Pressure cooker 10 lbs or more.
		Min.	Min.	Min.	Min.
Apples.....	3	15	15	10	6
Apricots.....	3	15	12	10	6
Asparagus, greens.....	2 or 3	60	60	40	30
Apple cider.....	2 or 3	20	15	12	10
Beans, Lima and string.....	2 or 3	90	60	60	30

	Size of cans.	Hot-water bath outfits at 212°	Water-seal outfits above 212°	Steam pressure cooker 5 lbs. or more.	Pressure cooker 10 lbs. or more.
Blackberries, Dewberries.....	2 or 3	8	8	6	3
Cherries, Peaches.....	2	15	12	10	5
Corn without acids.....	2	240	180	60	40
Grapes, Pears, Plums.....	2	15	15	10	6
Hominy.....	3	60	50	40	35
Huckleberries.....	2	10	8	6	3
Okra.....	2 or 3	60	60	40	30
Okra and tomatoes combined..	2 or 3	50	50	40	30
Oysters.....	1	50	50	40	30
Peas, (field).....	2	60	60	40	30
Peas (garden or English).....	2	60	60	40	30
Pineapple.....	2 or 3	30	25	18	10
Raspberries.....	2 or 3	15	10	6	3
Sauerkraut.....	3	50	50	40	25
Sausage.....	2	60	60	40	35
Sweet potatoes.....	3	80	70	60	40
Strawberries.....	3	10	8	6	3
Succotash.....	2 or 3	60	60	40	30
Tomatoes.....	2 or 3	22	20	10	6
Tomatoes and corn.....	2	80	70	60	40
Grape juice.....	2	15	15	10	5
Quince.....	3	30	25	15	10
Tomato juice.....	2	20	20	15	10
Pumpkin.....	3	50	50	40	30
Fish, pork.....	2	200	200	120	60
Chicken, beef.....	3	250	240	180	40
Figs.....	3	30	20	10	5
Squash.....	3	50	40	30	20
Spinach.....	3	60	60	40	30
Other greens.....	3	60	60	40	30
Rhubarb.....	3	25	25	15	10
Beets.....	3	20	20	15	10

NOTE: This is a supplement to Farmers' Bulletin No. 521. By following the general instructions of the bulletin in connection with the time table, you will have the information necessary to do the work of canning all kinds of fruit and vegetables.

The operation from now on can be best illustrated by some typical examples. We might start with strawberries, since they are considered the most difficult to can.

Canning Strawberries. The berries should be picked over, washed, and hulled. The washing can be carried out best in a colander or sieve of some kind so as to do away with as much handling and consequent bruising as possible. The berries can be placed directly in the jars.

Make a syrup using equal measures of sugar and water. Heat it just enough to dissolve the sugar. As soon as the jars are filled, the berries should be covered with the syrup. The covers are then fitted on loosely and when the rack is filled, all the jars are lowered at once into the sterilizer and left for the length of time indicated in the above table.

If the work has been done rapidly the glass jars will be warm enough from the sterilizing to render breaking unlikely. Each canner is usually provided with two racks so that while one lot of fruit is being sterilized another rack can be filled with a second set of jars. It will then be ready to take the place of the first when the time required for cooking is over. The time can be found by referring to the above table. For strawberries we see that it is ten, eight, five, and three minutes depending upon the type of canner used.

Proceeding in this way we are able to can strawberries with more than twice the rapidity of the open kettle method, and at the same time retain more of the flavor, color, and shape.

Canning Peaches. In canning peaches the operation is the same except that a preliminary scalding is necessary to remove the skins. The practice of peeling a peach with a knife is wasteful both of time and peach. The usual objection to the hot dip is that it softens the peach too much. This softening is in part avoided by dipping the peaches in cold water after the hot dip. The operation is made much easier if the fruit is put in a square of cheesecloth. The corners of the cheesecloth make a very convenient handle by means of which the fruit may be lifted in and out of the water.

Scalding and dipping in cold water can be carried out either in the canner itself or in any bucket or open kettle. After such treatment the skin can usually be removed quite easily without the use of a knife. The stone may be removed or not as desired. When left in they give a slight flavor to the fruit which is desired by many. The peaches are then put into the cans and the same syrup used for strawberries or one with more sugar is poured over them. On looking at the table we see that the time for cooking peaches is fifteen, twelve, ten, or eight minutes according to the type of canner used.

Canning Tomatoes. In canning tomatoes the operation is the same. They may be canned whole or in pieces, depending upon the size of the tomatoes, the size of the jars, and the use to which they are to be put. Instead of adding syrup, tomato juice and salt should be used, a teaspoon-

ful of salt to each quart. The practice of adding water to tomatoes is to be discouraged, since they already contain so large a proportion of water that any further addition tends to decrease both food value and flavor.

Canning Corn. Corn may be taken as another type to illustrate the methods of canning vegetables. Corn has for a long time been recognized as one of the most difficult of all the vegetables to keep. The process differs but slightly from those already described. The time of heating is longer.

The corn should be freshly picked. The cooking of corn while still on the cob for 10 minutes sets the milk and less is lost in the process of cutting off. The jars should be previously sterilized, as usual, and the corn packed in tightly. Add one teaspoonful of salt to each quart and the jar may then be filled with the liquid in which the corn has been cooked. The covers should now be placed upon the cans and the rack lowered into the sterilizer. The time necessary for sterilization is 4 hours, if the water bath cooker is used, 3 hours with the water-seal apparatus, and an hour with the pressure cooker. Where only the water bath apparatus is available fractional sterilization is better.

Canning by Heating on Three Successive Days. By fractional sterilization we mean the cooking of the material to be canned for a shorter length of time than is necessary for complete sterilization, on three successive days. It is one of the ways in which we are able to kill those microorganisms which form spores (see page 5).

The time necessary is usually about 1 hour on each of three successive days. The time depends upon the size of the can and the consistency of the material. It is one of the the safest ways to can those vegetables which ordinarily give trouble. While it is slightly more difficult than the method which involves only one cooking, it can be used in cases where the other has proven to be ineffective.

The method of cooking three successive days may be applied to all types of green vegetables, such as peas, beans, etc., with slight differences in the preparation and the length of time of cooking.

This method has been described by a practical housewife as follows :

"Spinach, Swiss chard, lambs quarter, are cooked down until tender in salt water in open kettle in order to get more bulk into cans. Then put into the jars until nearly full and pour on enough hot water to fill the jars full; to this add a scant teaspoonful of salt; put on the lid and screw down loosely without rubber (to allow steam to escape); put into steamer, which should be kept about two-thirds full of water, and boil one hour for each of two days. On the second day of boiling, about fifteen minutes before time is up, unscrew tops, put on rubbers and screw down tight and place back in steamer for fifteen minutes so as to seal rubbers. See also that the jars are full of water at the last cooking.

"The eggplant must be cut into slices and parboiled in salt water until tender; then place in jars and follow directions given for spinach.

"Peas, beans and all vegetables must be young, tender, and freshly gathered. Put into the jars cold; cover to overflowing with cold water

and put a full teaspoonful of salt to the quart; screw on the lid lightly, without rubbers; place in the steamer with enough lukewarm water to come up two-thirds on the jars (always keep adding boiling water to keep it just this high on the jar); steam for three days, one hour each day; then follow directions for spinach, etc., only do not put on rubbers until the third day—this holds good for all vegetables.

“This may seem a great deal of trouble, but will prove very simple when once tried. You simply lift the steamer from the stove, leaving the jars in it until the next day, when you put back on stove and proceed as directed. If you have more vegetables than the steamer will accommodate at one cooking, the jars can be removed and a cloth thrown over to prevent a draft of air from striking the jars and breaking them.”

Be careful that the jars do not touch each other in the steamer, as they will crack if they do.

Blanching. The government canning experts advocate the blanching of all vegetables before canning. By blanching is meant dipping in hot water for varying lengths of time, depending upon the material used. Blanching is supposed to set the color, get rid of certain volatile gases and make unnecessary the exhausting process which has been considered an essential step in canning in tin.

It should be borne in mind that in blanching a considerable amount of soluble material is lost. In the case any liquid is needed in the can this liquor should be used instead of water. With the bulky green vegetables a considerable shrinkage is brought about by the blanching. The shrinking makes it possible to fill the jars to much better advantage. The first cooking suggested above does all this without any loss of pot liquor.

We cannot urge too strongly the canning of all types of vegetables, for this is the best means of obtaining a well-balanced ration throughout the year. It will have the effect of making the garden last all the year round. In planting the garden this use should be kept in mind in order to furnish vegetables in sufficient variety and amounts for canning.

FRUIT JUICES

Value. There is too little appreciation of the many uses to which fruit juices may be put in the home. Their preparation is simple and takes little time or skill. Nothing is more refreshing on a hot day than an iced fruit juice which can be very easily prepared if the juice has been bottled at the proper season. Not only it is possible in this way to obtain the fruit juice for use at any season, but the amount of work involved is far less when the juice is extracted in quantity than when it is extracted in small amounts for occasional use.

Uses. Such juices may be used as a very pleasant addition to the daily menu as they lend themselves easily to many uses, such as ices, flavoring ice-cream, gelatine desserts, puddings, sauces, etc. Thus they make it

possible to greatly vary the dessert portion of the menu with little outlay of money, time, or strength.

Making. Any juicy fruit will give a good return in bottled juice. This may be extracted in the cold by the use of a fruit press as in cider making or with a smaller press. In case no press is used the fruit is cooked until the juice is extracted and drained as in jelly making. The extracted juice may then be put in bottles, sterilized, securely corked and sealed and labeled.

PRESERVATION BY MEANS OF SUGAR

Before our knowledge of bacteriology made it possible for us to can vegetables to the extent we now do, we made much greater use of the harmless chemical preservatives in the keeping of fruit. Sugar is the one which has been most used. There are two reasons why it is easier to preserve fruit when a large quantity of sugar is used.

In the first place, liquids which contain sugar can be heated to a much higher temperature than that to which water alone can be heated. The higher temperature will effect a more complete sterilization. Furthermore, micro-organisms cannot live in a solution of sugar as concentrated as that found in the usual preserves, jams and jellies.

The latter fact makes it unnecessary for us to seal these products in the same tight way that the canned foods must be sealed. The only precaution is that they should be covered to prevent the absorption of moisture because such a concentrated solution absorbs moisture from the atmosphere very readily. As a result any micro-organisms present will find the soil sufficiently dilute for their growth.

In order to prevent the growth of micro-organisms when the preserves are not to be sealed in jars, we cover the jars with paraffin. Though paraffin does not form an air-tight seal still it is sufficient to prevent the absorption of moisture and keep out the greater number of the bacteria. Since the paraffin cover is very easily broken, it must be protected by a tin cover or a heavy piece of paper pasted over all.

Various Fruit Products Preserved by Sugar. There are several names variously applied to different combinations of fruit and sugar, depending upon the proportion of the sugar used, the kind of fruit, and the part of the fruit. There is here, however, as with many other household products little uniformity. Listing the more familiar ones, we have preserves, conserve, jams, marmalades, butters, and jellies. It is worth while here as elsewhere to establish definite standards by which we may judge our products. It is difficult to produce something when a given word has a different meaning to each one. An attempt has been made to find the meaning which is most common.

A number of recipe books, books on canning, etc. have been reviewed and as far as possible the data summarized. Wiley in his "Food and Their Adulterations" (page 375) distinguishes between terms as follows:

“When the fleshy portion of the fruit is treated with sugar syrup and boiled it produces a product known as preserves; when a fruit product is reduced to a pulp and treated with sugar syrup and boiled, it makes a product known as jam, when the fruit juice itself is treated with syrup and boiled it makes a product known as jelly.” These are given as general definitions, but are too general for our purpose. Jelly probably can be disposed of first.

Jelly. No better definition can be found than the one given by Miss N. E. Goldthwaite (University of Illinois Bulletin, Vol. 8, No. 7, Principles of Jelly Making). “Ideal fruit jelly is a beautifully colored, transparent, palatable product obtained by so treating fruit juices that the resulting mass will quiver, not flow when removed from its mould; a product with texture so tender that it cuts easily with a spoon and yet so firm that the angles thus produced retain their shape; a clean product that is neither syrupy, gummy, sticky nor tough; neither is it brittle; and it will break with a distinct, beautiful cleavage which leaves sparkling, characteristic faces.”

All fruits as ordinarily used will not make a jelly as those of us who have followed the recipes in cook books will know. A thick mass is obtained in many cases which might be called either a syrup or a candy, but no one in their sanest moments would identify it with a jelly as described above.

In order to be used in making a satisfactory jelly a fruit must contain acid and pectin. The pectin is a carbohydrate which has been very little investigated. For our purposes it is sufficient to know that it is essential for successful jelly making. We may determine whether or not it is present in any given juice by adding to a small amount of that juice while cold an equal amount of ordinary alcohol (90 per cent to 95 per cent). If pectin is present a gelatinous mass will appear which can be gathered upon the end of a glass rod or a spoon. If there is none the solution should remain clear.

1. **The Best Fruits for Jelly.** The ideal fruits for jelly making are those which contain both acid and pectin, such as currant, partially ripe grapes, crabapples, sour apples, and plums. Blueberries make a surprisingly good jelly, while blackberries and raspberries may be used. Peaches, quinces, pears and sweet apples contain large amounts of pectin, but an insufficient amount of acid to cause the jell to form. However, very desirable jellies can be formed from these fruits by the addition of acids, tartaric or citric, to the juice. One level teaspoonful to a quart is usually sufficient, but much depends upon how acid the fruit is in the beginning. Stir to be sure that all the acid crystals are dissolved, then taste the juice. It should be about as acid as the juice of good tart apples.

The addition of so large a quantity of acid, while it enables you to make jelly from peach and pear juice, necessarily destroys the delicate flavor of these fruits. Jelly from sweet apples and quinces is improved in flavor by the acidity. Cherries and strawberries, though they contain both



A JELLY BAG

If the top were fastened to two nails instead of one the material could be introduced more easily.

acid and pectin, do not make ideal jellies. Miss Goldthwaite found that the quality of strawberry jelly was improved by the addition of a small amount of acid, but the flavor was not so good. The cherry juice was already so acid that no more acid was added. Both strawberry and cherry juice were found to yield a better quality of jelly, though by no means perfect, if cooked to a slightly higher temperature than ordinarily, thereby reaching a greater concentration. Pineapple was the only fruit investigated which contained no pectin.

2. **Extraction of the Juice.** Heating is necessary in order to extract pectin from the fruit. Frequently when no pectin is found in the raw, pressed juices of certain fruits, juice cooked out of the same fruit will yield large amounts of it. To juicy fruit add just the smallest possible amount of water and when heated through crush the fruit and cook the whole mass throughout.

Strain through moistened double cheesecloth or flannel bags. The fruit may be extracted a second or third time, a weaker extraction being the result in each case. The pectin test given above will show when the extraction has gone far enough. The less juicy fruits are used in the same way, only more water is necessary.

3. **How Much Sugar to Use.** Where most jelly makers fail is in the use of too large a proportion of sugar. Equal measures of juice and sugar is the usual way in which this proportion is stated. The indefiniteness of such a statement is at once realized when one knows that the proportion of sugar should be based upon the amount of pectin in the juice rather than the total amount of juice.

For those fruits which contain the largest amount of pectin and for those in which little water is used in order to extract the juice, the larger proportion of sugar may be used. When too small a proportion of sugar is used a tough jelly results. In case a jelly is too soft and inclined to be stringy, a smaller proportion of sugar will give better results. In no case did Miss Goldthwaite find that a proportion of sugar larger than one measure of sugar to one measure of juice was desirable. On the other hand, in many cases a more ideal jelly was made upon the proportion of $\frac{3}{4}$ as much sugar as juice. This result was obtained when water had been used in extracting the juice or when the pectin content was not especially high, as in some of the berries.

Since the juice from the second and third extraction must necessarily contain little pectin, a smaller proportion of sugar should be used, sometimes falling as low as $\frac{1}{8}$ as much sugar as fruit juice. The only means we have of judging whether or not the proportion of sugar is correct is by the character of the resulting jelly. The more sugar the more jelly or syrup, but we are aiming for quality not quantity. Repeating the statement made above, a tough jelly indicates too little sugar, a soft, sticky jelly (provided both pectin and acid are present) indicates too large a proportion of sugar. If your jelly is not a suc-

cess, cook it over, making the necessary corrections by adding sugar or juice as indicated. Only bear in mind the fact that if the pectin is cooked too long with the acid present, it may be destroyed and no jelly can be obtained.

4. **Aim in Making Jelly.** In jelly making our aim is to change the liquid fruit juice into a solid or make it jell, as we say. This is brought about by the combined effect of sugar, acid, and boiling upon the pectin of fruit juice. The effect is to cause the pectin to precipitate in a solid mass throughout the fruit juice, forming jelly.

5. **How Long Should Jelly Cook.** We have discussed the other three elements, the pectin, the acid, and the sugar, the question remaining is how much boiling is necessary. The jelly forms only when the fruit juice and sugar are boiled to a definite concentration. The time necessary to bring about concentration ranges from eight to thirty minutes. As would be expected, the jelly in which the proportion of sugar and juice is equal will reach the concentration sooner than one in which $\frac{3}{4}$ as much sugar as juice is used.

6. **How to Tell When Done.** The jelly 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." Since the concentration may be accurately determined by the temperature of the boiling solution, this point may be determined by reading a candy thermometer, the bulb of which is suspended in the boiling syrup. When it registers 103° Centigrade or 216° Fahrenheit the jelly is done.

7. **When to Add Sugar.** The best time to add the sugar seems to be after the juice has boiled about fifteen minutes, or for a length of time which experience tells you is about half that sufficient to cook the jelly. If the sugar has been heated before adding, it does not cool the jelly and make the cooking time longer.

8. **Skimming.** The juice should be thoroughly skimmed before adding the sugar. One very interesting economic point brought out by Miss Goldthwaite is that the skimmings are very much increased in amount when the sugar is added at the beginning, due of course to the presence of sugar in them. On the other hand, if the sugar is added too late it is not cooked sufficiently and the jelly may crystallize.

The above points can best be summarized by giving definite directions for making one of the typical jellies.

APPLE JELLY

1. **Extraction of Juice.** The same rules of cleanliness should be observed in jelly making as in canning. Whole apples may be used. They should be well washed and cut into small pieces to make it easier to extract the juice. As the pectin is more abundant just beneath the skin and around the core, such refuse portions from other operations may be used for jelly making. As small amount of water as possible is used

and the whole is cooked until the apple is well softened. Cooking is necessary in order to extract the pectin. The extraction of the apple juice in the cold, as in cider making, does not take out the pectin. For this reason it is impossible to make jelly from cider.

After the fruit is thoroughly soft, put in a bag and allow to drain. If the bag is a pointed one, the draining may be accomplished in a shorter time because of the pressure of the pulp into the point. When a clear jelly is desired, the fruit is allowed to drain naturally, but if we want to get all of the juice out, the bag may be squeezed. This squeezing of the bag results in a cloudy jelly. It is a question whether we should sacrifice the amount for the appearance. The advantages of both may be obtained by cooking the two lots of juice separately.

All the jelly making portion is not extracted by the first cooking. If a small amount of water is now added and the pulp recooked, jelly can still be made from the juice which results. The second portion is apt to lack flavor. Flavor may be added in the form of a juice which, although possessing good flavor, will not jell, such as peach, cherry, or strawberry.

2. **Cooking.** 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. The sugar may be heated in the oven, if it can be watched and burning prevented. The only object of heating the sugar is that if cold it would stop the boiling, thus slightly increasing the cooking time. The longer cooking also has a slight tendency to produce a darker jelly. Skim again if necessary. Cook until it will jell.

3. **When Cooked.** The easiest and safest way to test is by the thermometer. When the thermometer is inserted in the solution and registers 103° Centigrade or 216° Farenheit the jelly is done. (Care must be taken not to touch the bottom of the kettle with the thermometer as that would give the temperature of the kettle bottom rather than of the syrup.)

The experienced jelly maker can safely use other tests, such as dropping a few drops of the liquid on a cold plate. If it shows signs of jellifying when perfectly cold, the proper point has been reached.

4. **Putting Into Glasses.** If the jelly is strained into glasses, a clearer product will result, but the added labor and the risk of loss through slow action is usually greater than the value of any gain in clearness.

5. **Covering.** There are many ways of covering jelly, any one of which may be used. The object is merely to protect from molds, and insects and to prevent the jelly from either drying out or absorbing water. The jelly may be brushed with alcohol and covered with hot paraffin. A tin cover may be used or paper may be pasted over the jar. Always label carefully, as much trouble is eliminated thereby.

Using Paraffin. It is a good plan to keep on hand a small vessel for melting paraffin and to use it only for this purpose. One that will fit into the top of the teakettle is especially handy. The pieces of the paraffin



AIDS FOR THE SEALING AND LABELING OF CANNED GOODS.

which have been removed from jelly may be washed and saved, then used from year to year. 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 the water is cold. All the paraffin will be found solidified on the top and may be removed and saved.

When the Jelly Has not Been Cooked Sufficiently. If the jelly is but slightly soft, leaving the glasses in the sun for a day or two will be sufficient to complete the jelling process. The jelly should be covered to prevent dust accumulating upon it.

Other Kinds of Jelly. The process of jelly making does not vary, all kinds being made in the same way. The ripeness of the fruit often determines the color and flavor of the resulting jelly. For instance, Concord grapes, picked while green, give a very light colored jelly and one that possesses a different flavor than that made from the ripe grape.

Numberless varieties of flavor may be made by a judicious blending of fruit juices. But as this is a matter largely of personal preference, it will not be enlarged upon here.

Advantages of Canning Fruit Juices for Jelly. It is sometimes better simply to can the unsweetened juice and make the jelly at a more suitable time. Several advantages are:

1. It makes it possible to work under easier weather conditions, as most fruits are available at the hottest and busiest time of year. Jelly making comes at a time when the out-of-doors is most beautiful and one can find many winter days better adapted to jelly making.

2. The advantage which will appeal to many is saving storage room. Much juice can be stored in half gallon and gallon cans in a small space, while glasses take up a large amount of space.

3. A larger range of flavor is permitted since fruits may be combined that ripen at widely differing seasons. Any juice left over from canning and preserving may be saved and used for jelly making.

4. Time is saved because one can make more jelly in a day if but one of the operations required in jelly making is needed. In time of large crops much fruit juice may be canned and may later serve to tide over a season in which there may be a crop failure.

Orange Peel Used in Jelly Making. Before leaving the question of jelly making, attention should be called to one source of pectin of which the housewife is not usually aware. It has long been customary to use as a basis for jellies the juice of a fruit such as apple, which, though not especially well flavored, contains all the other essentials for making good jelly, and add to it varying amounts of other fruits which are made to jell with more difficulty, but which have an especially good flavor.

Miss Goldthwaite in the course of her experiments found out that the white inner peel of the orange and lemon is an abundant source of pectin. This fact accounts for the jelly-like character of orange marmalade and of the hand lotion made from the juice of the boiled-up lemon, glycerine and alcohol.

Orange and lemon peelings are a waste product in every home. If they were saved they might be used very effectively in jelly making. The yellow part contains the bitter principle and should be removed before boiling up the white to extract the pectin.

PRESERVES, JAMS, MARMALADES

The essential differences between preserves, jams, marmalades, and butters is nowhere clearly defined.

Preserves. Preserves originally meant the cooking together of definite quantities of fruit and sugar, usually equal quantities, to the point where it would keep without being sealed air-tight. In this case the sugar is so concentrated that it prevents the growth of any organisms. In preserves we aim to keep as nearly as possible the original shape and appearance of the fruit. The cooking in the sugar solution makes the fruit appear clear. In preserves we can distinguish two essentially different parts, the fruit and the juice.

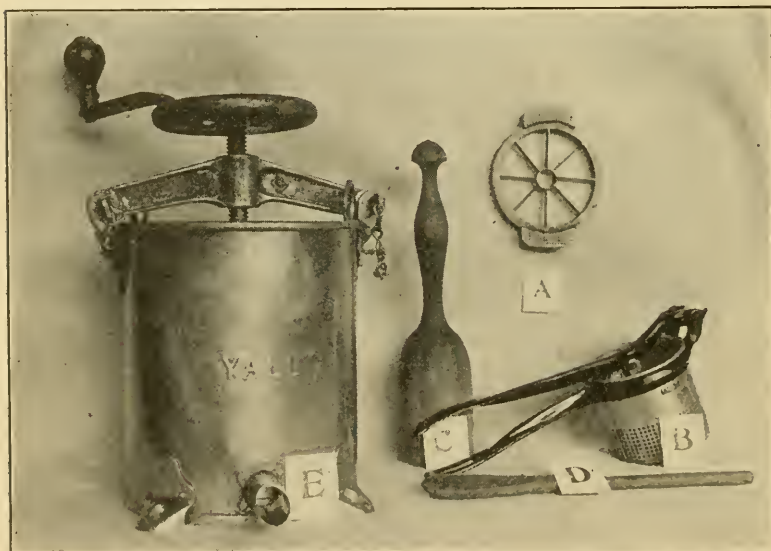
Jams. Jams differ from preserves in that the whole fruit is used. The fruit is crushed in the juice so as to produce a homogeneous mixture. As a rule only the small fruits of which the whole may be used are utilized in jam making.

Butters. Butters are more mixed and more smooth than jams. For this purpose we use fruits that contain a larger proportion of fleshy material. We also discard the seeds and skins.

Marmalade. Marmalade stands midway between jams and butters. Larger fruits are used for this purpose than are utilized in jam making.

Those fruits whose pulp will not produce the smooth consistency of a butter are used in marmalade making.

It is possible by changing the method of preparation to make both a butter and a marmalade from the same fruit, for example, the peach. If the peaches are cooked until soft before adding the sugar the consistency is usually that of a butter. On the other hand, if the sugar is added at the beginning of the operation and the pulp is preserved in small pieces rather than being cooked smooth, we can recognize two distinct portions, the juice, and small particles of preserved fruit, and the result is a marmalade.



HANDY UTENSILS TO BE USED IN PRESERVING FOODS

A, apple, slicer and cover; B, potato river; C, wooden masher; D, wooden spoon; E, large fruit press.

Amount of Sugar. In all of the above mixtures practically the same amounts of sugar are used. Formerly the proportion of equal weights of fruit and sugar was used. We now realize that better consistency and flavor is obtained with the use of less sugar. Three-fourths ($\frac{3}{4}$) as much sugar, by weight, as fruit will be sufficient to keep it when cooked to the desired concentration.

Some recipes will be found which call for a smaller proportion of sugar. Such proportions do not make preserves in the true sense of the term, for in such cases there is not sufficient sugar to keep the fruit unless sealed air-tight.

Such variation in the amounts of sugar called for by various recipes, makes the line between canned and preserved fruits extremely narrow and variable. That is why it is difficult to judge the great variety of entries under the title of "Preserves" at the usual Fair Exhibit.

Preserves should, both from the meaning of the term and the usage which has grown up around it, be considered as containing enough sugar to keep the fruit were the jar left unsealed, and the fruit should retain its original shape as nearly as possible.

Preserves should be so sealed as to prevent them from absorbing moisture. If the preserves are left so that they absorb this moisture the proportion of sugar is so reduced that it cannot prevent the growth of any organisms that may get in.

Principles Underlying Preparation. As there are so many ways of preparing preserves and like products, it might be well to consider a few essential principles. When the aim is to retain the shape of the fruit, it should be cooked from the beginning in a sugar syrup as that has a tendency to harden the fruit and thus retain the shape.

In the case of a fruit which contains a large amount of fiber or when the fruit is to be mashed, it should be cooked until tender before the sugar is added. There is no need to do this in the case of soft fruits.

When our aim is to retain the shape of the fruit we should decrease the handling of the fruit as much as possible. The making of candied fruits as it is done commercially affords a good example of this. Here syrups of gradually increasing density are poured over the fruit, thus producing the "candied" effect, without a large amount of cooking.

In the candying process the fruit must be cooked in a sugar syrup, for a short time, as this cooking makes it possible for the fruit to absorb the sugar and thus prevents shrinkage. The fruit is then allowed to stand until the syrup thoroughly permeates it, usually two or three days. The syrup should then be drained off, cooked down, and poured over the fruit again. This is continued until the syrup, after standing over the fruit, is of the desired thickness, as the syrup tends to draw out the water from the fruit.

If the fruit is cooked along with the syrup, stirring is necessary, which results in broken fruit and the continued heating gives an undesirable color to the fruit.

Sun Preserves. The above principle is used in the making of sun preserves. Here the heat of the sun gradually concentrates the syrup. As no stirring is necessary shape is retained. The low heat is not sufficient to change the color. The fruit must be heated up with the syrup before putting in the sun. When this is not done the fruit will shrivel, because the very thick syrup will draw out the water from the fruit but will not be able to get into the fruit to take its place. The previous cooking makes it possible for the fruit to absorb the syrup.

Conserve. Conserve is a name frequently given to a kind of preserves made from a mixture of fruits, to which nuts are usually added.

General Rules

Since it is desirable in all the above products to have a jelly-like rather than a candy consistency; all the rules observed in jelly making are to a less degree applicable here. Especially is it possible to produce a marmalade of more desirable consistency by the use of the pectin which may be cooked out of the white inside peel of the fruits usually employed in making marmalade. The addition of small amounts so obtained might materially improve the texture of other preserves without in any way changing the flavor. The test as to when the products are done should be the same as jelly, especially in the cases where there is any tendency to jell. Whenever the cooking is continued beyond the jelly temperature the mass usually is tough, and is more of a candy than a jelly.

The standards for each of these products can probably be held in mind most clearly by the use of a score card, which not only enumerates the different points to be kept in mind, but assigns a definite value to each. Score cards are included here.

SCORE CARDS

Canned Goods. In the canned product we should aim to have the fruit contain as near as possible its original shape and flavor. In the case of canned fruits the natural flavor of the fruit should not be hidden with too much sugar.

Score for Canned Fruit

Fruit—shape.....	15
color.....	15
flavor.....	30
Juice—flavor.....	15
clearness and consistency.....	15
Proportion of fruit to juice.....	10
	<hr/>
	100

Score for Canned Vegetables

Flavor of vegetable.....	35
Condition of vegetable.....	35
Proportion of vegetable to juice.....	20
General appearance.....	10
	<hr/>
	100

Score for Jelly

Color.....	10
Transparency.....	20
Taste.....	25
Consistency—hold shape, not flow.....	15
tender, will cut easily.....	15
firm, angles retain shape.....	5
No signs of crystallization.....	10

 100
Score for Preserves

Fruit—shape.....	10
clearness and color.....	10
flavor.....	15
texture.....	10
Juice—clearness and color.....	10
flavor.....	15
consistency.....	10
proportion of juice.....	20

 100
Score for Jams

Homogeneity (even distributing of pulp and juice and seed).....	30
Consistency.....	30
Flavor.....	30
Color.....	10

 100
Score for Butters

Smoothness.....	30
Consistency.....	30
Flavor.....	30
Color.....	10

 100
Score for Marmalades

Homogeneity.....	15
Consistency.....	25
Clearness.....	20
Flavor.....	25
Color.....	15

 100

PICKLING

Other preservatives than sugar which may be used are salt, vinegar and the various kinds of spices. Typical foods which are preserved by means of these articles are mincemeat, fruit cake, spiced fruit, meats, and pickles. Pickle is the only one which we will consider in any detail. It is worth while to note in passing, however, that the preservative action of the different spices varies. The spices are usually added for flavor, rather than for any preservative action they may exert. It is of interest to note to what extent one can depend upon the preservative action in the various spices.

(Note. Conrad Hoffman and Alice Evans in "The Preservative Action of Spices", *Journal of Home Economics*, volume 3, page 452 Vinegar is valuable as a preservative. Ginger, black pepper, and cayenne do not prevent the growth of organisms. Cinnamon, cloves, and mustard are valuable preservatives, while nutmeg and allspice delay growth. Cinnamon, cloves, and mustard are about equal in efficiency. Cinnamon and mustard are especially valuable for they are still palatable when used in proportion large enough to prevent all growths. Cloves in the proportion that would prevent growth are unpalatable. In smaller amounts cloves exert a retarding action.)

In pickles we make use of the preservative action of vinegar and spices. The use of salt in pickle-making is to draw out the water. The necessity for this is brought out very clearly by reference to the composition of the vegetables commonly used in pickle-making.

Percentage of Water in Some Common Vegetables

	Per cent Water
Cabbage.....	91.5
Beans (green).....	89.2
Beets.....	87.5
Cauliflower.....	92.3
Cucumber.....	95.4
Onions.....	87.6
Tomatoes.....	94.3

The brine most frequently used is made by dissolving one measure of salt in eight measures of water. In those pickles in which the vegetable is finely divided a brine is not used, but alternate layers of salt and vegetable are packed down in jars, the last layer being salt. This is allowed to stand for a few hours.

If the vegetables were used without previous treatment, the resulting liquid would be so dilute as to have no preservative action. When the vegetables are soaked in brine, the action of the strong salt solution is to draw the water out. The water can be separated from the vegetables by

squeezing the pickle in cloths. Where too much salt is left in the pickle, it should be removed by washing with vinegar. Washing with water would only defeat our purpose, as it would put back in the vegetable the water we had taken so much trouble to remove. The water might, of course, be cooked off, but this would so soften the vegetables as to render them unfit for use as pickle. Crispness is a desirable attribute of all pickles. After the vinegar and seasoning have been added the whole mass should be heated or the hot vinegar may be poured over the pickle. In the latter case the vinegar should be drained off, reheated, and again poured over the pickle for three successive days. This treatment with the hot vinegar causes the vegetable to absorb the vinegar and the seasonings. A large number of recipes call for alum, as it makes the pickle move crisp and firm. Since in the opinion of experts, alum is a most undesirable addition to our foods, its use in this case is to be discouraged.

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.

Formula for Sweet Pickles

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

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 peach 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 pear and proceed as above.

Crabapple Pickles. Crabapples need not be peeled. If they are pricked 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 rind makes a very good pickle. Trim off all of the red and the green parts, cut in suitable pieces, and put the rind to cook in salted water ($\frac{1}{2}$ tsp. to one quart). 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

$\frac{1}{4}$ to $\frac{1}{2}$ cup of sugar
1 oz. ground mustard
2 tablespoons of 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 Station, Bulletin No. 245, p. 89.

Spiced Vinegar for Sour Pickles

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

Reference, F. M. Farmer, Boston Cooking School Cook-book, p. 584.

Chili Sauce

Take two quarts of ripe tomatoes, four large onions, four peppers, chop them fine, then add four cups of vinegar.

3 tablespoons of brown sugar
2 tablespoons of salt
2 teaspoons of cloves
2 teaspoons of cinnamon
2 teaspoons of ginger
1 teaspoon of allspice
2 teaspoons of nutmeg

Boil together until quite thick, then bottle for use.

Pickle Lily

One peck of green tomatoes
Two quarts of onions
Two or three 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 mus-

tard seed and one cup of grated horseradish. Put in a cloth bag two tablespoons of ground allspice, two tablespoons of ground cloves, 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 case of Pickle Lily. The kinds and amounts in the various mixtures is a matter of personal preference.

Scores for Pickles

In pickles the preservation is effected by the use of vinegar and spice. This means the strength of the vinegar must be sufficient to exert a preservative action and that it must be sufficient in amount to cover the pickled material. Any sign of spoiling ought to disqualify the sample of pickle.

Score for Plain Vegetable Pickles

These are judged under three heads (1) sweet, (2) sour, (3) dill. The same score being used in each case.

Score	
Flavor.....	30
Texture—firm not tough.....	20
not soft or flabby.....	30
Color.....	10
Proportion of pickle to liquid.....	5
General appearance.....	5
	100

Mixed Vegetable Pickles

Choice and proportion of materials	20
Consistency and color of fluid.....	10
Flavor.....	30
Texture of vegetable material.....	30
Color.....	5
General appearance.....	5
	100

Score for Relishes

In this class is included all the finely ground pickles.

Choice and proportion of materials.....	20
Size and uniformity of pieces.....	10
Flavor.....	40
Texture of material.....	20
Color.....	5
General appearance.....	5

 100
Score for Sweet Fruit Pickles

A sweet fruit pickle has two distinct parts, the fruit and the juice. The aim should be to retain as much as possible of the flavor in the fruit. The only function of the juice is to serve as a flavoring medium and source of flavor for the pickled fruit.

Texture of fruit.....	25
Flavor.....	40
Appearance of fruit.....	10
Clearness of syrup (Cloudiness indicates loss of substance from the fruit).....	10
Consistency of syrup.....	10
General appearance.....	5

 100

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