



The 4-H Girl Learns to Can Food and Store Preservation I



Yes, Carolyn and Marilyn are sisters and twins too. You may not be so fortunate in having a helper when you are ready to do your canning of tomatoes. However, you can assist Mother and do part of the canning alone. The jars of tomatoes that

Marilyn is taking from the canner will help provide that Vitamin C for the family next winter when they do not have fresh fruits.

Since you are learning to preserve food you will be canning foods that are less difficult to can, such as toma-

toes and fruits. You probably know that fruits are most important in our diet and contain important food elements that our bodies need to give us pep and to make us feel and look well. If we are to keep all these food elements

it is necessary to follow certain directions when preserving food. In this project you will learn to can by the best methods now known, and also how to store and dry vegetables and fruits.

PRESERVATION OF FOOD BY CANNING

Canning is one method of preserving food so that it can be used at a later time. Heat is used to kill all the things which would cause spoilage and the product is sealed in air-tight containers so nothing which would cause spoilage can get to the food. Canned foods make it possible to have foods at a time when they are not available fresh. Therefore, better meals for less money are possible the year round. The health value of an improved diet cannot be measured in dollars and cents.

Canning Equipment for Tomatoes and Fruits

The right kind of canning equipment saves time and labor and insures a better finished product. By careful planning, many families could find it possible to obtain the right kind of tools to work with and canning would be easier and afford more pleasure. Before the canning season begins, the canning equipment available should be gotten in order and ready for use and a list made of the new equipment needed.

Canners.—The largest piece of equipment needed for canning fruits and tomatoes is the processing kettle which is frequently called "the canner." There are two general types of canners or kettles used for canning tomatoes and fruits—the water bath and the steam cooker or steamer.

Any container may be used for a water bath if it has a flat bottom, a well-fitted lid, and sufficient depth to allow the jars to be covered with one inch of water when placed on a rack in the bottom of the utensil. A large

kettle, a wash boiler, a lard can or a good-sized bucket is frequently used for a water bath. Its size should be suitable to the number of jars one usually cans at one time.

A rack is needed to keep the jars from direct contact with the heat as the jars may break if no protection is afforded. The circulation of water or steam around the jars is better if they are lifted one inch or more from the bottom of the processing kettle. Wire baskets or racks to fit the processing kettle may be purchased or made by a tinner at small cost, or a false bottom may be made at home of strips of wood, folded hardware cloth, or wire netting.

The chief advantage of water bath equipment is its cheapness. Any home can have this sort of equipment and it can be used to can fruit, tomatoes and other acid foods very satisfactorily.

There are several disadvantages of this type of equipment: (1) It requires large amounts of water. (2) It requires much fuel to heat the water to the boiling point and to keep it there during the processing period. (3) For long processing periods, boiling water must be added to the original boiler from time to time to keep the jars covered.

A steam cooker or steamer is a container at least an inch taller than the jars. It has a well-fitted lid which allows only a small part of the steam to escape. It must have a rack for the jars to steam on. There are a number of different types of steam cookers on the market. Large roast-

ing pans, waterless cookers and other large kettles with well-fitted lids are sometimes used as steam cookers for canning. Pressure cookers may be used as steamers by fastening the lid on securely and having the petcock open during the processing.

Glass Jars.—More persons use glass containers for canning foods than tin because they have glass jars and there is not the additional expense of buying

spoilage organisms, and may prevent a perfect seal. Sometimes a slight roughness may be removed by using sandpaper.

Pint and quart jars are best for canning while $\frac{1}{2}$ pints or smaller containers are common for preserves, jams, and similar products. Tomatoes, fruit, and other acid foods are sometimes packed in $\frac{1}{2}$ gallon jars for large families.

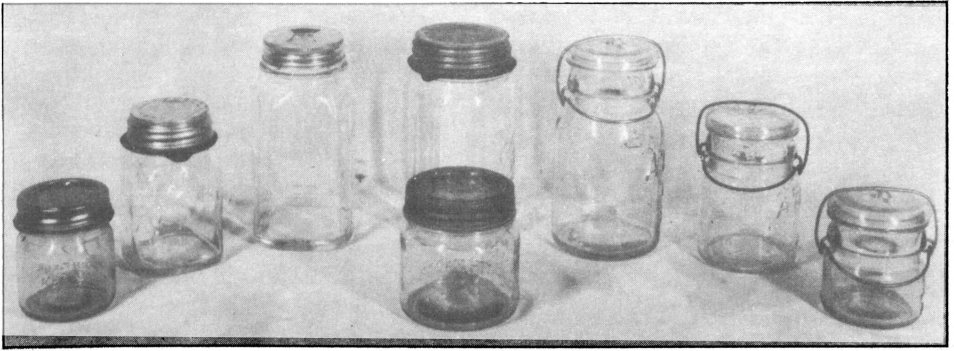


Fig. 2.—Various types of glass jars. Beginning at the left in the picture, the first and third jars are equipped with self-sealing or vacuum sealing tops. The second jar and the two in the exact center of the picture have the common screw tops. The three jars on the right have glass tops held in place by wire springs and are self-sealing.

a tin can sealer. Glass jars have eye appeal for the canner, who enjoys seeing and showing her work. Glass jars can be used over and over again, year after year as long as they are not cracked or chipped. Any of the several types of jars on the market are satisfactory if they can be sealed perfectly. A large opening, simple construction, ease in cleaning, and easy, perfect sealing are characteristics of a good jar. The jars should be well tempered so as to stand a high temperature and a change of temperature without breaking. A clear colorless glass is preferable for exhibit purposes. All of the glass jar and especially the top and the shoulder, should be smooth and without nicks because rough places are hard to clean, make good lodging places for

Lids.—There are three general types of lids for glass jars; the self-sealing or vacuum type, the screw top, and the spring glass top or lightning top. There are two types of self-sealing lids; the lacquered tin lid or flats that seals with cement and the glass-top lid which has an indentation and rests on a small rubber at the top of the jar. The lids or flats are fastened with a metal ring which screws down or with wire clamps. The lacquered flats must be purchased new each year. These self-sealing lids cannot be tested because the seal is not made until the jar has cooled after being processed.

The screw top lids may be used as long as they are sanitary and will make a seal. They should be replaced if the porcelain in the top becomes

loose, the metal corroded, or otherwise damaged. A screw-top lid from a jar of spoiled food, if used the second time, may spoil the product even though the lid has been washed in very hot water.

The wire clamp or bail is the important thing to examine in the spring-top or lightning type jars. The spring and clasp should be tight and strong and it should close on the lid with a snap. If the wire clamp becomes loosened after use, it can be tightened by removing the top wire, bending it down in the middle and bending the sides inward if necessary, to fit the jar.

Tin Cans.—The tin cans which are sealed by a sealing machine may be used three times if they are properly reflanged.

Other Equipment.—A clock, shallow pans, preserving kettles, a colander, wire basket, jar funnel, a measuring cup and spoons, a quart measure, a ladle or dipper, jar lifters, long handled spoons, wooden spoon for stirring, stainless steel paring knives, spatula, scissors, household scales, vegetable brush, strainer, and large pans for washing products are other desirable pieces of canning equipment. A desirable jar lifter is light weight but of sturdy construction, and it grips the jar firmly without slipping and its handles are long enough to prevent burning of the hands.

For heating food use utensils of aluminum, or good grades of enamelware, or stainless steel. Galvanized iron utensils should not be used for cooking any food or for holding acid foods which have been cut, as they will take up zinc from the metal and become poisonous. Use copper or copper lined utensils for cooking fruits and vegetables only if the utensils are kept bright and shiny and the food removed immediately after cooking.

Otherwise these utensils may contaminate the food.

Lots of heat and water, adequate working surfaces at the right height, comfortable stools or chairs, and a screened, airy, light place to work are valuable assets in canning.

Methods of Canning

The three general methods used in canning are the open kettle or cooked-in-the-kettle method, the cold pack, and the hot pack method.

Processing is the heating of the jars or cans of food at a temperature sufficiently high for a long enough time so that the canned food will keep.

Open Kettle Method.—With this method, the food to be canned is cooked until it is done and then immediately packed in hot sterilized jars and sealed. The jars must be filled brim full and all air bubbles removed. Jars must be boiled or steamed for 10 minutes to be sterilized. Rinsing the jars with hot water does not sterilize the jar.

The open kettle method is sometimes used for acid foods as tomatoes and peaches and frequently used for preserves, jams, conserves and marmalades which have liberal amounts of vinegar. Even for most of these foods, however, at least 5 minutes of processing is desirable.

Loss of food through spoilage is high with the open kettle method since it is difficult to keep the container and food sterile when transferring the food from the kettle to the jar and usually some air is dragged in. Soft fruits canned by this method usually break more and become mushy, while fruits with aromatic flavors lose much of their delicate flavor. The loss of vitamin C is frequently greater with the open kettle than with the cold pack or other cooked-in-the-can methods.

Cold Pack Method.—When the cold pack method is used, the product is packed into the can raw, boiling liquid or sirup is added, the container

is sealed and then processed in a water bath or steam cooker. When the food is placed in the container cold it takes a longer time for the food at the center of the jar to reach a high temperature, especially when the product is a thick and pasty product such as cream style corn or a dense fibrous product as greens. Fruits with a rather large portion of liquid, however, heat through quickly and the texture, form, color, and flavor of all except very hard fruits are usually superior if they are canned by the cold pack method.

Hot Pack Method.—When the hot pack method is used the product is partially cooked, then packed into the container when very hot, and processed the required length of time.

More food can be packed into a jar by the hot pack method, and it may be the preferable method for canning all products if the number of jars is limited and jar space is an important factor. With the hot pack method, the food material is wilted and shrunk and the air driven out. By having the food boiling hot at the beginning of the processing period, the food at the center of the can is processed as long, and at more nearly the same temperature, as the food near the side of the jar. This method is preferable for all foods except fruit, tomatoes and other acid foods.

Oven Canning.—The jars of food are placed on the rack in the oven and the temperature of the oven should be kept between 250° and 275° F.; therefore oven canning should be done only in ovens that have controlled heat. Too hot an oven will ruin the rubbers. As the jars are heated steam forms in the jar and it forces its way out and some liquid from the jar will bubble out, if the jars are filled to within a half inch of the top. Only partially sealed glass jars can be processed in the oven because the accumulated

steam might break a sealed jar or spread and push out the seam of a tin can. This would be a waste of food and one might get a dangerous burn if the can or jar should burst while the oven door was open. The air in the oven is not as good a conductor of heat as is water, so the processing time in the oven would need to be longer than that of the water bath. Peaches, packed hot, require 15 minutes for processing in quart jars in the water bath, but 25 minutes in the oven.

Some of the liquid usually bubbles out of the jars in the oven and is lost. Light fruits as peaches and pears are likely to develop a brownish discoloration after processing in the oven.

Steps in Canning

To have a high quality canned product that will keep, careful attention needs to be given to the following directions, as well as to the directions for canning individual foods.

1. Prepare Equipment.—Assemble all the equipment that will be needed for canning the product and make sure it is in order and ready for use. Wash jars, cans, rubbers, and lids in soapy water, rinse and place in a pan of hot water—so they will be clean and hot when needed. Make sure that all the pans, towels, etc., are clean, as cleanliness is a most important factor in successful canning. If screw-top or spring-clamp jars are used, test the rubbers and the jars. Used rubbers which show the imprint of the lid should not be used. Good rubbers show no pin holes or cracks when pinched. To test the screw-top or spring-clamp glass-top jars, pour about a cup of hot water in the jar, adjust the rubber and lid, the invert. If there is leakage, press down on the edge of the screw-top lid, tighten the clamp of the glass-top jar or try other lids until there is no leakage. Keep

the proper lids and jars together. Have the processing kettle on and the water near the boiling point. If a sugar sirup is needed, make it in advance so there will be no delay when it is needed.

2. Select High Quality Products.—Select fresh, sound products that are at their best eating stage. Grade for size and the same degree of ripeness or maturity if a uniform product is desired. Foods that have grown slowly, are over-mature, or have been gathered for some time are more difficult to can than fresh food in prime condition. *Two hours from the garden to the can is a good rule to follow in canning berries, tomatoes, and other vegetables.*

3. Wash Products.—Wash the fruits or vegetables thoroughly until every trace of soil is removed. The most dangerous bacteria and the most difficult ones to kill are in the soil. Always lift the fruits and vegetables out of the water, rather than pouring the water off. Wash fruits that have caps or stems, such as strawberries, cherries, and grapes, before stemming so that there will be less loss of juice and so water will not go into the fruit and hasten fermentation.

4. Prepare Product for Processing.—Prepare the product as for cooking and follow the directions given for each product on page —.

5. Pack the Food in the Container.—When using glass jars, remove one jar at a time from the hot water, as keeping the jars hot helps to prevent breakage and lessens the number of spoilage bacteria present during packing and processing. Pack the container quickly so the precooked food remains hot. Use a sufficient proportion of liquid to solids to prevent too dense a pack and work out the air bubbles with a knife blade or spatula. Leave $\frac{1}{2}$ inch of head space in glass jars for tomatoes and fruits. Tin cans

should have from $\frac{1}{4}$ to $\frac{1}{2}$ inch head space. The solid material in the jar should be covered with liquid, sirup, or juice to preserve color, texture, and flavor.

6. Adjust Covers of Jars.—As each glass jar is packed, carefully wipe the top of the jar and the rubber ring to remove any particle of food, and then adjust the lid to seal the jar. With self-sealing tops, screw the bands on firmly, or put on the clamp. Seal tin cans as rapidly as possible after filling them. If too much air is left in the can when sealed, the food may discolor and lose some flavor, and the processed tin can will cave in.

7. Process the Food.—Place the containers on the rack of the canner which contains boiling or near-boiling water. Do not crowd the jars, as this may cause the jars to break as they expand when heated. Crowding the containers will also interfere with the proper circulation of the water or steam. In a water bath the water should be at least 1 inch deeper than the height of the tallest jar so that the top of the jar will be processed at the same temperature as the rest of the jar. Cover the water bath with a well fitted lid and keep the water in a rolling boil for the required processing time. If a large boiler using two burners or holes on the stove is being used, do not turn out one fire after boiling is reached—turn down both burners—one burner may not keep the water boiling throughout the vessel. There should be enough water in the steam cooker to prevent the cooker from becoming dry during the processing period, and the steam should be kept “up” throughout the processing time. As memories are poor, it is desirable to write down when the jars or can should be removed from the cooker or canner. Make sure the food is processed the

length of time and at the temperature indicated for each product on page —. If the water in the canner stops boiling or more water needs to be added, deduct the time it takes to bring it back to boiling.

8. Remove from Canner, and, If Necessary Readjust Lids.—Remove the lid from the water bath or steam cooker and with the aid of a jar lifter immediately remove all the jars or cans. Push down the clamp on the spring top jars and screw the tops of the screw top jars immediately as tightly as possible. Turn all other jars but those with self-sealing lids, from side to side to make sure there is no seeping of air or leakage. Do not attempt to tighten the top of jars with self-sealing lids. When the jars start to cool after processing, steam condenses in them and a partial vacuum is formed within the jars. Greater pressure outside the jar than inside presses the top down firmly and the seal is formed. It is preferable to cool all jars in an upright position. Wipe all containers to make sure they are clean and shiny.

9. Cool the Containers.—Cool canned products as quickly as possible but be especially careful not to break the jars. Do not set the hot jars on cold metal surfaces. Cool the jars out of a draft but allow air space around jars or can for more rapid cooling. Tin cans should be cooled by putting them in cold water, preferably running water. When the jars are cold gently tap the metal lids of the self-sealing type jar with a spoon to see if they are properly sealed. If properly sealed they will give a clear ringing note. If not properly sealed the sound will be dull in a low key. Invert other jars as soon as removing from preserving kettle to make sure there is no leakage and then turn immediately upright for cooling. If there is any leakage, the jars should

be opened, the contents reheated, re-packed, and reprocessed one-half the regular processing time. Do not attempt to tighten the lids after the jar is cooled, as this would break the seal. Remove the bands or clamps from self-sealing jars when the jars are cold and save them to use again. If left on they may rust in storage and be difficult to remove.

10. Store.—Label all tin cans giving at least the name of the product. It would be interesting to label some jars to determine the preferred variety. Store in a clean, cool, dry, frost-proof place on shelves labeled for the year. Examine containers from time to time to make sure they are keeping. If there is any spoilage carefully examine all containers from that lot.

Canning Tomatoes

Tomatoes are easy to can if one follows the proper directions and if one does not try to can too many at one time. Spoilage bacteria grow rather rapidly after tomatoes are picked from the vine so the sooner the tomatoes are canned after they are picked the better canned product one can have. If the tomatoes are allowed to stand in a warm room for sometime after the preparation for canning has begun, flat sour spoilage may occur. For canning select firm vine-ripened tomatoes of medium size, uniform shape, and those free from spots and decay. Well ripened tomatoes have a superior color and flavor. If one must can tomatoes that are green around the stem or have sunburned, white, or other spots, cut away all the green or other off-colored portions as they will give an inferior flavor and color. Do not try to can tomatoes that have a soft or spoiled part as they are so juicy it would be difficult to prevent the spoilage organisms from getting on the good part of the tomato. A bushel of good toma-

atoes will yield from 16 to 18 quarts of tomatoes.

After washing the tomatoes, place them in a wire basket or a thin cloth and dip them in boiling water from 1 to 3 minutes depending on the degree of ripeness. If the tomatoes are well ripened the skin will slip off easily at the end of one minute. If the tomatoes are kept in the boiling water too long, the pulp will be softened and cling to the skin when it is removed. After the hot water, plunge them quickly into cold water until they are just cool enough to handle. Remove every bit of the cone shaped core from each tomato with a slender pointed knife. Slip the skins off with the hands. The cold or the hot pack method may then be used for canning the tomatoes. For cold pack, pack the tomatoes as closely as possible into the jars or cans. Tomato juice may be added or the tomatoes may be cut and pushed down so firmly that sufficient juice is formed to fill the spaces and cover the solid portions. Add one teaspoon of salt per quart.

Adjust the seal and process in a water bath or steamer for 25 to 45 minutes, for quart glass jars. If difficulty in keeping canned tomatoes is experienced in your community it is well to process them for the 45 minutes, otherwise 25 minutes would be sufficient.

For hot pack place the prepared tomatoes in a kettle with a well-fitted lid and heat until all the tomatoes are

hot through. It will take longer to heat whole tomatoes than it will if the tomatoes are cut. Pack into the jars, add one teaspoon of salt to each quart. Apply the seal and process 5 minutes in a water bath or a steamer.

More tomatoes can be packed into a jar if the hot pack method of canning is used.

Canning Fruit

Of raw fruit as gathered, 1½ to 2½ pounds will usually yield one quart or a No. 3 can of canned fruit. It is preferable to can fruit and other acid foods at a temperature not higher than 212° F., so a water bath or steam cooker are preferred for canning them.

Sirups for Canning Fruit

Fruits may be canned with a thin, medium, or thick sirup. The kind selected will depend upon the use to which the canned fruit will be put, the sourness of the fruit, the closeness of the pack and the tastes of the family using the canned fruit. If the sirup is too heavy it will cover the fruit flavor and tend to shrivel the fruit, causing it to rise in the jar. If the sirup is too light the juice and the fruit will lack proper body and flavor. The sirup should be made and poured over the fruit boiling hot. Enough sirup should be used to cover the fruit and to fill the jar to within one-half inch of the top. The amount of sirup needed will vary with the size and kind of fruit and the firmness of the pack. Ordinarily, however, each quart jar will require on

APPROXIMATE YIELD OF CANNED FRUITS FROM RAW FRUITS

Fruit	Quantity Raw	Yields
Apples (2-6 per lb.)	50 lbs. or 1 bushel	18-20 quarts
Black or red raspberries	1 crate, 6 gal.—36 lbs.	14-16 quarts
Cherries (with seeds)	1 gallon	3-4 quarts
Gooseberries	1 gallon	3-4 quarts
Grapes	48 lbs. or 1 bushel	12-16 quarts
Peaches (5-8 per lb.)	48 lbs. or 1 bushel	13-20 quarts
Pears (3-4 per lb.)	50 lbs. or 1 bushel	25-30 quarts
Plums (15-20 per lb.)	56 lbs. or 1 bushel	28-30 quarts
Rhubarb	2 lbs.	.1 quart
Strawberries	1 crate of 6 gallons	11-12 quarts
Tomatoes	55 lbs. or 1 bushel	16-18 quarts

an average from $\frac{1}{2}$ to 1 cup of sirup. Three cups of water and the required amount of sugar will ordinarily yield enough sirup for 4 or 5 quart jars.

To make sirups of thin, medium and heavy density vary the proportions of sugar and water as follows:

Thin sirup

1 cup sugar 3 cups water
Mix and heat to boiling point.

Medium sirup

1 cup sugar 2 cups water
Mix and heat to boiling point.

Heavy sirup

1 cup sugar 1 cup water
Mix and heat to boiling point.

Fruit juice may be used in place of water in making the sirup. A heavy sirup may be diluted to form a medium or thin sirup.

Saving Sugar.—To save sugar some people can fruit without sugar but if sugar is needed when the canned fruit is used, it is preferable to add at least a part of it when the fruit is canned as sugar helps fruit retain its natural color, flavor, and form. If fruit is plentiful, the ripe fruit may be used to make juice and the fruit canned in this juice with sugar rather than the suggested sirup. Sirup made from fruit juice is usually sweeter than when the sirup is made with water. Honey may be used to replace up to $\frac{1}{2}$ of the sugar called for in canning and corn sirup up to $\frac{1}{3}$.

Specific Directions

All processing times are for quart jars.

Apples.—Apples may be canned in several different ways. Choose apples that retain their shape when heated for the first two methods and apples that cook up for the last one. (1) Pare, core, and cut into desired pieces (to prevent darkening of pieces exposed to air place them in cold water which contains 2 tablespoons of salt and 2 tablespoons of vinegar for each

gallon of water). Pack into hot jars and add a hot medium or thin sirup, depending on the tartness of the apples. Adjust the seal and process 20 minutes in a water bath or steam cooker. (2) Wash, core, and precook by baking or by boiling 5 minutes in thin or medium sirup. Pack into sterilized jars, cover with the sirup, and process 15 minutes in a water bath or steam cooker. If no sirup is added, process 20 minutes. (3) Prepare apple sauce by cooking sliced apples in a small amount of water until tender. Do not peel or core the apples but remove all spoiled portions and the bud end. Put through a strainer. Add sugar to taste. Pack into hot jars, adjust lids, and process 5 minutes in a water bath or steam cooker.

Blackberries, Dewberries, Raspberries, Huckleberries.—Gather berries in a shallow container to prevent crushing and can them as soon as possible after picking. Wash carefully and remove caps and stems. Sort out the less perfect berries, make juice from them to use in making the sirup. For the best flavor and texture use the cold pack method, that is, pack firmly into hot containers and fill with a hot medium sirup. Adjust lid and process 15 to 20 minutes in a water bath or steam cooker. To save jar space and to can for use when the appearance of the fruit is not important use the hot pack method.

To each pound of berries add $\frac{1}{2}$ to 1 cup of sugar, according to the sweetness of the fruit. Stir gently, boil 2-4 minutes, pack immediately in hot sterilized containers and process 5 minutes in a water bath or steam cooker.

Cherries.—Can either pitted or unpitted, depending upon the way they are to be served. If unpitted, prick, pack in hot containers, cover with hot medium sirup for sweet cherries and heavy sirup for sour cherries. One may use juice from pitted cherries to

make sirup. Adjust seal, and process for 20-25 minutes in a water bath or steam cooker.

If pitted, save all the juice and heat the cherries in it with sugar to taste, for 5 minutes, pack immediately in hot containers, covering the cherries with the juice. Process 5 minutes in water bath or steam cooker.

Gooseberries.—Stem, sort, and wash. Pack firmly in hot containers, add hot heavy sirup, adjust seal and process 20 minutes, in a steam cooker or water bath.

Hot Pack: Boil until tender, add $\frac{1}{2}$ cup sugar to each quart, pack into hot containers and process 5 minutes in a water bath or steam cooker.

Peaches.—Peel or remove the skin by immersing in boiling water for about $\frac{1}{2}$ minute or until skin will slip easily, and then plunge into cold water. Cut in halves, remove pits, leave in halves or slice as desired. Pack in hot containers and add a hot light or medium sirup in which one cracked peach pit for every quart of sirup has been boiled. Process 25 minutes for soft fruit; 35 minutes for firm fruit in a water bath or steam cooker.

Hot Pack: Simmer peaches in sirup for 4 to 8 minutes. Pack immediately in hot jars and process 15 minutes in a water bath or steam cooker.

Pears.—Hold Keiffer pears 2 weeks after harvesting, at a temperature of 60° or 65° F. Peel, cut in halves and core. Slice if desired. To prevent discoloration place in cold water containing 2 tablespoons of vinegar and 2 tablespoons salt per gallon. Cook in medium sirup 4 to 8 minutes according to the size of pieces and the firmness of pears. Pack in hot jars, cover with sirup and process 20 minutes in a water bath or steam cooker.

Ripe Bartlett pears—peel or not and cut as desired, pack in hot jars and cover with hot medium sirup. Process

25 minutes in a water bath or steam cooker.

Plums.—Can when just beginning to ripen. Wash, prick each plum to prevent the skin from bursting, pack in hot containers and cover with a hot medium sirup. Adjust lids, process 20 minutes in a water bath or steam cooker.

Hot Pack: Add sugar to taste, boil 1 to 5 minutes. Pack in hot jars, adjust seal, process 5 minutes in a water bath or steam cooker.

Rhubarb.—Select young tender stalks, trim, wash, being careful to cut clear through the pink skin so it will not peel off. Cut in $\frac{1}{2}$ inch lengths. Add $\frac{1}{4}$ as much sugar as rhubarb by measure. Bake in a covered baking dish until tender. Pack into hot containers, adjust seal, process in water bath or steam cooker 5 minutes.

Bring cut rhubarb to a boil in a heavy sirup, pack into hot containers, adjust seal and process 5 minutes.

Pack raw rhubarb in hot jars, add hot heavy sirup. Adjust seal, and process 20 minutes in a water bath or steam cooker.

Strawberries.—Gather in shallow containers, wash carefully, remove caps and to each quart of berries, add 1 cup sugar. Heat slowly to the boiling point and let stand over night. In the morning bring to the boiling point quickly, pack in hot jars, adjust seal, and process 5 minutes in a water bath or steam cooker. There will be extra juice to can separately or to use in some other way.

Place the clean berries in shallow pans in a single layer. Sweeten to taste, place in a cool oven—250° F. for an hour. Pack immediately in hot jars covering with the best juice. Process 5 minutes in a water bath or steam cooker.

Why Fruit Floats in the Jar.—Heating any food drives the air out and it

wilts or shrinks. When fruit is cooked in a sirup that is heavier than its own juice, the juice in the fruit passes out into the sirup by a process called osmosis. This causes the fruit to shrink, become lighter and floats to the top of the jar. The heavier the sirup the greater the loss of juice from the fruit.

Heating fruit that has a delicate structure as strawberries breaks down the cell walls, the juice escapes, the fruit shrinks and floats. Fruits that

have a firmer structure, if over-processed, lose juice, shrink and float, leaving a clear sirup at the bottom of the jar. The more over-cooked the product, the higher the clear juice extends.

Discolored Fruit.—Fruit at the top of the jar often turns dark on standing. This may be due to spoilage or to enzyme activity which indicates under-processing. Peaches, pears, and plums are frequently so affected.

SCORE CARD FOR CANNED FRUITS AND VEGETABLES*

Package	10
Tightly sealed containers of specified size, clean, neatly labeled. If tin cans are used, they should be bright, with ends slightly sunken.	
Pack	20
Fullness	
All space except proper headspace should be filled.	
Proportion of fruit or vegetable to liquid	
The liquid should just cover the product with no excess.10	
Product	50
Absence of defects	
Fruit of very good quality and right degree of maturity, free from indications of spoilage.10	
Uniformity	20
Pieces of fruit or vegetable should be reasonably uniform in size (fancy pack not practical).	
Color—as nearly that of the original as is possible after cooking, free from foreign matter.	
Consistency—tender without overcooking.	
Flavor	20
Characteristic of the fruit or vegetable.	
Liquid	20
Clear—little or no cloudiness or small particles, free from gas bubbles. Sirups for fruits have suitable proportions of sugar.	

*Adapted from material sent out by the Bureau of Home Economics.

Explanation of the Score Card

Jar, lid, and cans should be clean and free from any discoloration. The label should be pasted on straight and about one inch from the bottom of the jar, if the jar is to be stored.

The liquor over the vegetable should not be clouded by starch from too mature vegetables or over-cooking or from particles of the vegetable which have broken off in the processing. A bluish film on the bottom of the jar sometimes indicates flat sour. The

liquid or juice of fruit should be clear and have a pleasant characteristic fruit flavor. A juice of medium or thin consistency, sweet enough to cover some of the acidity but not the characteristic flavor of the fruit, is desirable.

The fruit or vegetable should have a firm texture and retain as nearly as possible the shape and color of the perfect fresh product. Tomatoes or red fruits should not be pale or faded. Fruits and vegetables should not be

overcooked so that they look soft and mushy. Perfect fruit with no blemish is preferable as nearly as possible, all the fruit or vegetables in a jar should be uniform in size and color. The fruit should be of tender texture, good quality, thoroughly ripe, but not overripe.

The best flavor for canned fruits and vegetables is the one that is most pleasant and most distinctive of that particular fruit or vegetable. It should not taste noticeably sweet or salty, since the sugar and salt should emphasize, not cover, the natural flavor.

PRESERVES AND MARMALADE*

Preserves are small fruits or pieces of larger fruits cooked in a sirup until clear and stored in the sirup or jellied juice. These are wholesome sweets that can be made from any fruit but much nicer preserves are made from fruits that contain a high percentage of acid and pectin. Firm, ripe fruit is preferable as ripeness is needed for flavor and firmness for good texture.

Care should be taken in preparing preserves to have uniform pieces of fruit, not to overcook it, and not to add so much sugar that the flavor of the fruit is lost. Strawberries, peaches, plums, pears, cherries, quinces, watermelon rind, tomatoes, and pineapples are fruits which are commonly preserved. Some varieties of berries and peaches yield much better preserves than others.

Making Preserves.—Make only a small amount of preserves at a time using not more than 6 to 8 pounds of fruit. Prepare fruit as for cooking, keeping small fruit whole and cutting large fruit in uniform, fairly good-sized pieces. Weigh rather than measure the fruit and use three-fourths as much sugar as fruit, by weight. The amounts of sugar will vary some, however, with the sourness of the fruit and

The following words may be used in judging or comparing canned products: finer texture, coarse texture, natural color, good color, faded, off color, overcooked, undercooked, firm, soft, mushy, underripe, overripe, free from spots and blemishes, free from mold, liquid of excellent consistency, clear, bright, not clouded, cloudy, too thick, too thin, jar not full enough, good taste and flavor, flat taste, white sediment, free from sediment, characteristic fruit flavor, young, tender, uniform in size, shape, color, full pack, too loose a pack, pieces have ragged edges.

its pectin content. All fruit must be heated either in sirup or in water to change the cell walls so they will absorb sugar. Cooking in sirup tends to toughen the cell walls. Soft, easily crushed fruit as berries will need little or no water from the start. The heavy sirup will help the fruit to hold its shape. If fruit is hard, as are quinces, pineapples, and some varieties of pears, add enough water at the start to form a very thin sirup and the fruit will become tender before the sirup becomes heavy by evaporation. Starting hard fruits in a heavy sirup will cause them to become tough. Juicy, tender fruits should stand several hours in sugar so they will become more firm and not go to pieces when cooked. The juicy fruits with firm skins, as cherries, may be ground, or they may be started in a heavy sirup as the sirup is thinned rapidly as the juice comes from the fruit during the heating.

Use shallow pans and much heat, as the shorter the time of cooking the brighter their color and the richer and more delicate the flavor of the preserves. Too much cooking will result in dark color and strong flavor. Boil the fruit and sugar mixtures until

*Adapted from Farmers Bulletin No. 1800, "Homemade Jellies, Jams and Preserves."

the fruit becomes clear and the sirup no longer runs off the spoon but goes off in a wide drop or sheet. Lemon juice may be added during the last few minutes of cooking to fruits that lack tartness. The lemon improves the flavor and causes the sirup to jell. Fill sterilized jar three-fourths full of fruit and fill with the juice, seal, label and store.

Pear and Peach Preserves

The Kieffer pear is a variety commonly used for preserving because it holds its shape and has a good flavor. It is important to allow the fruit to reach the firm-ripe stage. If possible, store Kieffer pears for 2 or 3 weeks at 60° to 65° F. to obtain the best qualities for preserving and canning.

Any variety of white or yellow peach of good dessert quality will make satisfactory preserves if chosen at the firm-ripe stage.

Wash and pare the fruit. Cut into uniform pieces such as quarters, or pieces such as halves, quarters, or eighths. To each pound of prepared fruits allow $\frac{3}{4}$ to 1 pound of sugar. Combine the fruit and the sugar in alternate layers and let stand 8 to 10 hours or overnight before cooking. Or add the sugar and one-fourth cup of water for each pound of the fruit and cook at once. In either case stir carefully while heating to boiling. Boil rapidly until the fruit is tender and clear and the sirup is somewhat thick, stirring to prevent burning, being careful however not to break the pieces of fruit. Pour at once into hot sterilized jars and seal.

Damson Plum Preserves

Wash the fruit, drain, and prick each plum in three or four places. For each pound of fruit use one-half cup of water and $\frac{3}{4}$ to 1 pound of sugar. Dissolve the sugar in the water and bring to boiling. Add the

plums and boil gently until the fruit is clear and tender and the sirup sheets from a spoon. Pour into hot sterilized jars and seal.

Strawberry Preserves

The color and flavor of strawberries are easily destroyed by heat. Hence, in making preserves it is well to cook them only a short time.

Method 1.—Select large, firm, tart berries. Wash, drain, and remove caps. For each pound of fruit use 1 pound of sugar. Combine the fruit and the sugar in alternate layers and let stand 8 to 10 hours or overnight before cooking. While heating to boiling, stir carefully. Boil rapidly for 15 to 20 minutes or until the sirup is somewhat thick, taking care to prevent burning. Remove the scum. Pour at once into sterilized jars and seal.

Method 2.—Pick out the smaller, less-perfect berries. Crush and cook for about 3 minutes, stirring while cooking them. Strain. To each pound of choice berries allow $\frac{1}{4}$ cup of this juice and 1 pound of sugar. Add the sugar to the juice, stir, and heat slowly until the sugar is entirely dissolved. Drop the berries into the sirup, simmer for 3 to 5 minutes, then boil rapidly for 10 to 15 minutes, or until the fruit is somewhat clear. Remove the scum. Allow the preserves to stand about 8 hours or overnight in a glass or porcelain bowl. Fill hot sterilized jars three-fourths full with the berries without reheating them. Boil the sirup rapidly until fairly thick, or to 221° F. Pour the hot sirup over the berries and seal.

Tomato Preserves

Select firm, small yellow or red pear-shaped tomatoes. Wash and drain. If a tomato preserve without skins is desired, dip the tomatoes into boiling water, then into cold water, and re-

move the skins before starting the preserving process. The tomatoes must then be handled with extra care to prevent their going to pieces. To each pound of tomatoes allow $\frac{3}{4}$ cup of water, $\frac{3}{4}$ pound of sugar, $\frac{1}{4}$ lemon thinly sliced, and one piece of ginger-root. Boil the lemon for 5 minutes in part of the water. Make a sirup with the remainder of the water and the sugar. Add the tomatoes, the ginger-root, the lemon, and the liquid in which the lemon was cooked. Boil until the tomatoes are clear and the sirup somewhat thick. Remove the scum; then pour the preserves at once into hot sterilized jars and seal.

Marmalade is a bright sparkling product in which whole small fruits or pieces, slices, or shreds of fruit are suspended in a transparent jellied mass. It is really jelly in which pieces of fruit are suspended. All fruits that can be used for jelly will make good marmalades. Use one-fourth under-ripe fruit for making marmalades; from two-thirds to equal parts, by weight, of sugar as fruit pulp is used. Certain fruits are especially desirable for marmalades because of this tart flavor and high pectin content both of which are important in making juice jell.

Grape Marmalade.—Wash the grapes and remove the stems. Press the pulp from the skins. Cook the pulp and put it through a sieve to remove the

seeds. Add the skins to the pulp. Measure this mixture and add two-thirds as much sugar as pulp. Cook the mixture until the skins are tender, or about 20 minutes and seal at once in clean hot jars.

Amber Marmalade.—Select an orange, a grapefruit, and a lemon—each smooth, thick-skinned, and free from blemishes. Remove the peel, slice it very thin, add a quart of cold water, and parboil for 5 minutes. Drain off the water, add a quart of fresh water, parboil again, and drain. Add water a third time and parboil.

Cut the fruit pulp into thin slices and remove the seeds and rag. Combine the sliced pulp with the drained peel. To each pressed measure of this mixture of fruit pulp and parboiled peel, add twice that quantity of water and boil rapidly for about 40 minutes. Then weigh or measure this mixture and to it add an equal weight or measure of sugar. Add an eighth of a teaspoon of salt. Boil the fruit mixture and the sugar rapidly for 25 minutes, or until it thickens and becomes amber-colored. Stir the mixture as it cooks down, to prevent scorching. Let the marmalade stand in the kettle long enough for the shreds of peel to distribute themselves uniformly throughout the jellied juice—that is until it is slightly cooled. Stir and pour into hot sterilized jars and seal, or pour into hot sterilized jelly glasses and cover with paraffin.

SCORE CARD FOR PRESERVES AND MARMALADES

Package	10
Sealed jars of uniform size. Clean and neatly labeled.	
Product	50
Color—characteristic of the fruit, clear, free from discoloration due to over-cooking.	
Consistency—	
<i>Preserves</i> consist of tender whole small fruits or uniform pieces of larger fruits in sirup or jellied juice, depending on the kind of fruit.	
<i>Marmalades</i> have the characteristics of both jellies and preserves. They contain the pulp and may also contain the skin suspended throughout the jellied juice. In citrus marmalades both jellied juice and slices or shreds of fruit appear. The product should be clear.	
Flavor	40
Characteristic of the fruit, free from excessive sweetness or overcooked flavor.	
Total.....	100

CARE AND USE OF CANNED PRODUCTS

After the products are canned, care must be taken in handling the glass jars to avoid breaking the seal. Jars with self-sealing lids should have the bands or clamps which hold the lids in place, removed before the jars are stored. Intense light, heat or cold will cause a loss of color and a softening of the canned product. Freezing will not cause canned food to spoil unless it breaks the seal and permits bacteria, yeast or mold to enter the jar. Freezing will break the cells which make up the food, however, and the texture and form of the product will be less desirable.

Canned products should be stored on shelves. If new shelves are built, they may be made wide enough for 2 or three rows of cans or jars. A twelve inch board is wide enough for 2 or 3 rows. Shelves should be about 10 inches apart for glass jars and a support placed about every 30 inches. Tin cans may be stacked in 2 or 3 tiers. Properly canned and stored foods will keep almost indefinitely but the quality is better if used within the first year after canning.

DRYING OF VEGETABLES

Drying is the oldest method of preserving food. In drying enough moisture is removed from the food so that the spoilage organisms cannot grow. Drying is a very desirable method of preservation to use when canning equipment or storage space is limited.

Dried foods add variety as they have a flavor and texture that is different from the flavor of the same kind of fruit canned, brined, or preserved by some other method.

Drying Methods.—There are two main methods of drying—sun drying and drying with artificial heat. Drying with artificial heat is preferred for vegetables except herbs, mature beans, and mature peas. The greater the cir-

Inspecting Canned Fruits and Vegetables

Before opening any kind of canned food, the can should be examined for signs of spoilage. Corrosion of the lid, or any unusual deposit or sign of leakage about the rubber or on the can would indicate an imperfectly canned product. Because most spoilage is accompanied by gas formation and since most products are hot when placed in the can and shrink when cooled, tin cans should be flat or curved slightly inward on both ends and all seams should be tight and clean with no trace of leakage.

When the jar is opened, if there is an outrush of air or spurting of the liquid, it indicates spoilage. If the air rushes inward it shows that the seal was perfect. As soon as the jar is opened, one should see if the odor is similar to the fresh product, as an "off" odor would indicate spoilage. The contents should appear sound, natural in odor and the liquid free from cloudiness. All foods that show any sign of spoilage should be destroyed.

culcation of air, the faster evaporation occurs. The temperature should be as high as possible to dry the product from the inside out and still not cook the product. If the temperature is too high the product will become hard on the outside making it difficult for the inside moisture to escape. The best temperature for drying varies with the product being dried and is given in the directions for drying a specific vegetable.

Sun Drying.—For sun drying, the food should be placed on a frame so the air will flow under as well as over it. Some protection against insects, dust, rain, and dew should be provided. When the sun is very hot there is little

difficulty from flies and other insects but at such times the food needs to be stirred frequently to prevent overheating. A sloping roof with a south exposure makes an excellent place for sun drying. The food should be placed in the shade an hour or so before it is first placed in the sun. It should not be taken out in the sun until the dew is well dried in the morning. It should be removed before the dew starts forming in the evening.

Oven Drying.—Food may be dried in the oven. Place the food on large cookie sheets and keep heat low and constant and stir the material often to insure even drying. The oven door is left open to allow escape of moisture and to keep the temperature low. If the oven does not have a heat regulator use a thermometer and try to keep the food at the desired temperature.

Drying by Other Artificial Heat.—A simplified drier may be placed on a stove or over other sources of heat.

Equipment for Drying.—Expensive drying equipment is not necessary. A drier which will fit over the stove or other unit of heat, which favors rapid circulation of air over and under the food and protects the food from dust and insects is highly desirable. The drier shown in Figure 3 is very easily constructed and most farm homes will have scraps of material that can be used for making it.

A reliable thermometer is an insurance against damaged products. A dairy thermometer, which costs about 50c is satisfactory for this purpose.

A large kettle or wash boiler with rack, a steamer or a pressure cooker are preferable for blanching or steaming the vegetables before the drying process begins. Containers that will exclude air, light, and moisture are desirable for storing the dried products.

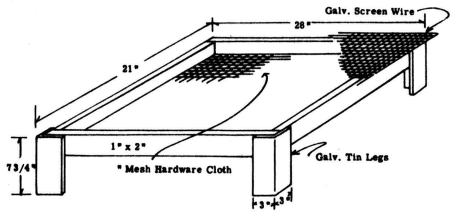


Fig. 3.—Simplified fruit and vegetable drier.

BILL OF MATERIAL

- 1-1"x2"x8' White Pine
- 4 Pieces galv. tin 7 $\frac{3}{4}$ "x6"
- 1 Piece galv. screen wire 24"x30"
- 1 Piece $\frac{1}{4}$ " mesh hardware cloth 24"x30"
- 36- $\frac{3}{4}$ " Gauge 5 round head screws
- 8 No. 6 Common nails
- 36- $\frac{3}{2}$ " galv. poultry netting staples

Simplified Fruit and Vegetable Drier.—The poultry netting is stapled on the bottom of the frame. Small cross braces are not necessary. The galvanized tin legs are fastened to the frame by means of screws. The screen wire is simply laid on top and not nailed. It may be temporarily tacked if necessary. To prevent No. 6 nails from splitting pine, grind points off before driving. Two or three trays may be made and stacked on top of each other.

Best Products for Drying

All vegetables do not dry successfully. Corn, herbs, mature beans and mature peas dry well and may be stored successfully until the next growing season. Snap beans, new peas, okra, pumpkin, squash, kale, and leafy green vegetables may be dried with some degree of success. These vegetables cannot be stored successfully develop a hay-like odor and flavor when for longer than 2 or 3 months as they stored too long.

Sweet Corn.—Select corn that is in the milk stage or when just right for eating as roasting ears. It is important to start drying the corn as soon as possible after gathering. Field corn may be used but the dried product is not as good.

Husk the ears and remove any worm injuries—silking is unnecessary as when dry they may be blown away. Hold in boiling water or steam 8 to 12 minutes to set the milk. Young corn will require more heat for this than old corn. Drain, cool, and cut the grains off the cob making sure that no cob is removed with the kernels. Spread the kernels evenly on trays $\frac{1}{2}$ to $\frac{3}{4}$ inches deep and start drying at a temperature of 165° F. and decrease the heat as the corn dries. Stir frequently to separate grains and break up masses. The corn shrinks rapidly in drying, and when partially dry, the contents of three or four trays can be put into one and the other trays made available for reloading with a fresh lot. In heating corn watch carefully as corn scorches easily.

When the corn is sufficiently dry, the kernels are hard, brittle, and semi-transparent and break like glass.

Some families have tried and liked the cream method of drying corn. In using the cream method the corn must dry very quickly to prevent mold and it must be stored in a cool dark place to prevent rancidity. For the cream method, clean, cook, and cut the corn as for the dry method. To each gallon of corn add $\frac{1}{2}$ cup of salt, $\frac{1}{2}$ cup of sugar and 1 cup of sweet cream. Mix thoroughly and dry as directed above. It should be dried in one day, conditioned 24 hours and immediately stored in sealed containers. Twelve big ears of corn will yield about a pound of dried corn.

Mature Beans and Peas.—Navy beans, soy beans, lima beans, and mature peas are suitable for drying. Some varieties of pole beans make a desirable product if picked and dried when the beans are from $\frac{2}{3}$ to $\frac{3}{4}$ full grown. Gather when seeds are mature but before the pods are yellow and dry. Shell and dip 3 minutes in

boiling water. Drain and spread on trays about 1 inch thick. Dry at 115° F. to 120° F. to begin the process, allowing temperature to rise to 140° F. Stir frequently at beginning. The process is complete when beans and peas are dry and brittle and will show no moisture at the center when split open.

Many families think it takes less effort and gives a satisfactory product to let the beans stay on the vines until the vines dry, then shell the beans and immediately treat them for storage.

To Treat for Storage

Harvest beans and peas when they are mature and dry on the vines. Treat them soon after they are harvested so that all stages of insect pests will be killed. After treating, the beans and peas must be kept in a dry, tight container such as a lard can, other tin container, or glass jars, as they may become re-infested.

1. *Dry Heat.*—This method is generally used when small quantities are involved. Spread the dry shelled beans or peas to a depth of one-half to three-fourths inch in shallow pans and place in an oven with a temperature of 120° F. to 145° F. for 3 or 4 hours. If the seeds are to be used for planting do not let the temperature rise over 135° F. If one does not have a thermometer the proper temperature may be judged by the hand. The pan or container should be just warm enough to handle comfortably.

2. *Stored in Hydrated Lime.*—Beans treated by this method must be very thoroughly washed before cooking. Mix one pound of hydrated lime to each 2 pounds of dry shelled beans, if a small quantity is being treated. If a large quantity is being treated use one pound of hydrated lime to 4 pounds of beans.

Seasonings.—Parsley leaves, mint, celery leaves, sage, dill, and other herbs, are *not* blanched before the drying process begins. Choose plants that are well developed, wash, spread out on trays and dry at a temperature of 115° F. to 130° F. The herbs may be broken up when dry to save storage space. The drying process may be done in a cool oven, 150° F., with the oven door open. Some people dry herbs by using the heat left in the oven after baking. Others dry herbs by hanging them in the shade. When "bone dry" they should be stored in containers that are air tight and moisture proof.

Green Beans.—Dried green beans do not hold their flavor well so only the late varieties should be dried for winter use. Some varieties of late beans make very satisfactory dried products while others are always tough and woody in texture and deficient in flavor. Cut the beans in either of the following ways in 1 inch lengths, in long thin strips, shred them, or slice them on a kraut cutter, then steam or blanch 5 minutes and dry at a temperature of 120° F. to 130° F.

Leafy Green Vegetables.—Beet tops, kale, mustard greens, turnip greens, and spinach are satisfactory when dried if used within several weeks after drying. Wash, strip out the mid rib if it is quite prominent, steam or blanch the leaves for 5 or 7 minutes, spread out on trays not more than one inch deep and dry at a temperature of 125° F. to 140° F. stirring frequently.

Conditioning the Dried Food

Since all pieces of food to be dried are not the same size and shape and consequently are not equally dry, it is necessary to expose the product to a low temperature so the moisture can redistribute itself throughout the pieces and thus obtain a product with uniform dryness. This process is

called conditioning. Keep the dried food in a shallow covered box, set in a warm place and shake the box or pour from one box to another two or three times a day. No definite amount of time can be given for conditioning or curing the dried product. Corn can be finished in a day or two, while fruit will require about a week.

After conditioning, place the dried food in shallow pans and heat to a temperature of 165° F. to 185° F. for 10 to 15 minutes to make sure it is free from all insect eggs and other organisms which might cause the food to spoil. If a thermometer is not available put the food in a slow oven and heat until it is too warm to handle comfortably with the bare hands. Stir the food frequently during the heating.

Storage of Dried Food

Foods must be dry and cool before they are stored. They should be packed in containers that will exclude air, dust, light, moisture, insects, and rodents. Sirup buckets, tin cans, stout paper bags, and glass jars which are nicked or unfit for canning placed in paper sacks to exclude light are types of containers that might well be used for storing dried foods. Dried foods should be kept dry so cloth bags are not desirable for storing dried foods as they are not moisture proof. It is preferable to put the foods in small containers rather than in large ones since each time the container is opened to take out food some moisture will be absorbed by the rest of the food in the container. A number of small bags may be filled, sealed, and placed in a lard can or a stone crock to store.

Keep the dried foods in a cool, dark, dry place. The food should be examined frequently and if there is any sign of moisture reheat the dried products to 165° F. and reseal. After a long rainy season examine the dried products to make sure they are dry.

A moldy piece may give a bad flavor to a whole bag of dried food. Dried fruits, owing to their high sugar content, have better keeping qualities than vegetables. Green growing vege-

tables, that are dried, lose flavor and texture and develop a hay-like odor in a few months. One should not attempt to keep these products more than 2 or 3 months and then only in sealed containers.

STORING FRESH FRUITS AND VEGETABLES*

Many vegetables can be stored profitably in the fall for use during the winter months. Less work and expenses are involved in storing vegetables than in canning, or drying them and the quality of a stored vegetable is frequently superior to the quality of a canned vegetable. Some vegetables, however, are at their best eating stage before the season is advanced far enough to make storage possible and then it is desirable to can the product.

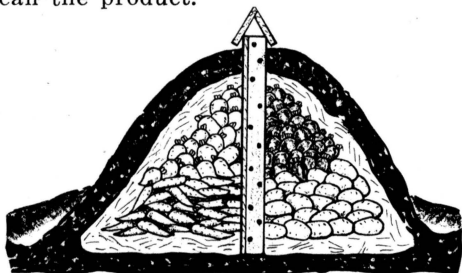


Fig. 4.—Outside storage pit for large amounts of vegetables. Note ventilation.

Every vegetable, even though it is removed from the ground, vine or stalk where it grew, is still alive. It continues to carry on certain life processes with a continued exchange of gasses between the vegetable and the air. Successful storage must first provide conditions that will greatly slow up these processes but yet at the same time provide for their continuance at a much reduced rate.

The essentials for success in storing vegetables are: (1) A good sound product in the proper stage of development, free from insect, disease or

mechanical injury; (2) proper curing; (3) the right temperature; (4) favorable moisture conditions; (5) proper ventilation.

Vegetables may be stored in an outside cellar, a basement, a partly heated room or an outside pit or trench. In general arrangements must be made to store vegetables requiring different conditions as follows.

1. Vegetables, like root ones, that need to be put in a cool moist place.
2. Vegetables like onions, that require a cool dry place.
3. Vegetables like squash, pumpkin, sweet potatoes, dried beans and peas that need a warm dry place.

An outside cellar affords the most ideal storage place for those vegetables which require cool, moist conditions.

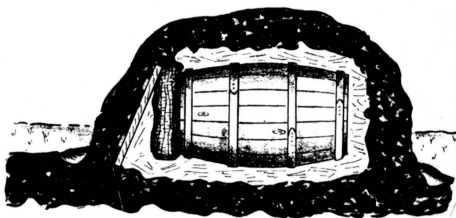


Fig. 5.—Barrel covered with straw and dirt provides safe storage for vegetables.

An outside pit, properly constructed and managed, will also afford good storage for root crops. The pit should be located in a well drained place with no danger of flooding during the storage season. A shallow pit, 6 or 8 inches deep is dug and lined with 4 to 6 inches of straw or leaves. The

*Material on storage has been adapted from Extension Circular 480, Storing the Family Food Supply, by J. W. C. Anderson and K. B. Huff.

vegetables are then piled in a cone-shaped pile 2 or 3 feet high (depending upon the amount of vegetables to be put in the pile) and covered with a layer of straw or leaves about six inches deep and then 6 to 8 inches of dirt, leaving the straw stick out at the peak of the pile to afford ventilation until the weather becomes severe. This will need to be covered with some material to prevent rain from getting in. When the weather becomes colder, another layer of straw and a layer of dirt is piled over the pit. The layers of straw afford dead air spaces that help prevent freezing of the vegetables.

It is better to put a variety of vegetables in a number of small pits so that when one pit is opened some of every kind of vegetable is obtained and the entire contents can be removed to the house. When the weather is severe it is difficult to open a pit and remove part of the vegetables without danger of frosting some of those left.

In the case of a large pit a ventilator, built by nailing four 6-inch boards together, may be placed in the center of the pit before the vegetables are placed around it. The top of this ventilator should be covered with a simple roof, as shown in the diagram, which will prevent the water from getting in when it rains.

It is well to locate the pit on the north side of a building or in a well shaded place to protect it against the direct rays of the sun which is of particular advantage when the pit is built early in the fall.

In making the mound the dirt used in covering it can be taken from close to the pit thus making a ditch around the mound to carry off the surplus water and thus prevent water from soaking into the pit and causing spoilage of the vegetables within.

Barrels and Boxes

Barrels and boxes may be used for storing fruit crops and cabbage and those crops adapted to pit storage by either setting the barrels or boxes down in the ground, filling them with the crops and then covering them with alternate layers of straw and dirt, or placing them on top of the ground and covering them with alternate layers of straw and dirt in order to insulate the crops against freezing.

The end to be opened may be covered with a sack full of straw against which is leaned some boards and the dirt banked on the outside. This arrangement makes it easy to open and at the same time prevents freezing.

Trench Storage

Another method of storing some crops which involves the same principles as pit, barrel or box storage is trench storage. In this type of storage a trench is dug about a foot wide, lined with straw and then the crops placed in the trench. Such crops as Chinese cabbage, celery and sometimes cabbage are stored in the trench. These are often wrapped in moisture-proof paper and placed in the trench or they may be removed from their growing places with the roots attached and transplanted into the loose dirt in the bottom of the trench. In either event, after the trench is filled, a covering of boards is laid over the trench and then alternate layers of straw and dirt are piled on top in order to insulate against freezing.

Carrots, Beets, Turnips, Rutabagas and Winter Radishes

All of these root crops should be harvested, if possible, when the ground is dry and the dirt does not cling to them. The tops should be twisted off about a half-inch above the root to avoid excessive loss of moisture. If

VEGETABLE STORAGE GUIDE

Vegetable	Temperature Requirements	Moisture Requirements	Ventilation
Beets	Cool - 32° to 40° F.	Moist	Limited
Carrots	Cool - 32° to 40° F.	Moist	Limited
Turnips	Cool - 32° to 40° F.	Moist	Limited
Winter Radishes	Cool - 32° to 40° F.	Moist	Limited
Rutabagas	Cool - 32° to 40° F.	Moist	Limited
Parsnips	Cold - Ordinary freezing will not injure	Moist	Limited
Salsify	Cold - Ordinary freezing will not injure	Moist	Limited
Horseradish	Cold - Ordinary freezing will not injure	Moist	Limited
Irish Potatoes	Cool - 36° to 40° F.	Medium	Limited
Cabbage	Cool - 32° to 40° F.	Medium	Medium
Chinese Cabbage	Cool - 32° to 40° F.	Medium	Medium
Celery	Cool - 32° to 40° F.	Roots Moist, Tops dry	Medium
Onions	Cold - 30° to 34° F.	Dry	Maximum
Squash	Warm - 40° to 50° F.	Dry	Maximum
Pumpkin	Warm - 40° to 50° F.	Dry	Maximum
Sweet Potatoes	Warm - 55° F.	Dry	Maximum
Beans (dry)	Unimportant	Dry	Unimportant
Peas (dry)	Unimportant	Dry	Unimportant
Corn (dry)	Unimportant	Dry	Unimportant
Canned Products	Above Freezing 32° to 80° F.	Dry	Unimportant

All of these except celery and Chinese cabbage may be stored all winter.

the tops are cut too close to the roots the fresh cut affords a place for excessive evaporation and also a place for the entrance of rot organisms.

These roots store best at temperatures from 32° to 40° F. They require moist storage conditions to prevent shrivelling. The moisture in the storage place should be as high as possible and still avoid the collecting of it on walls or ceilings or on the vegetables themselves.

Some ventilation is necessary, particularly at the beginning of the storage period. At this time the roots are still respiring rapidly and thus giving off moisture. Considerable air is required to carry away this excess moisture and also to supply oxygen to them. As the storage period continues and the respiration slows down less ventilation is required. It is best to keep them in a dark place.

This group of vegetables can all be stored together. They are well adapt-

ed to storing in a simple outside cellar or cave or in a basement where these requirements can be met. They may be piled on a dirt floor and covered with moist soil or placed in a box of sand or dirt which may be kept moist. If the storage place has a tendency to be dry, moisture may be added by sprinkling the floor or dampening the dirt or sand in which they may be packed. Small quantities may be successfully kept by placing them in a stone or earthenware jar covering the container loosely with boards. In this case it is not necessary to put sand or dirt over them. If they have a tendency to become wet, make wider openings in the cover to allow more circulation. On the other hand, if they start to shrivel cover them more tightly.

Irish Potatoes.—This crop is the first one to be ready for storage in Missouri. By careful attention to the simple rules of proper harvesting, curing, and storing they may be suc-

cessfully kept throughout the entire winter.

Irish potatoes should be allowed to mature fully before harvesting. Unless fully mature, the skin of the potato cannot give effective protection against evaporation and the entrance of decay organisms.

Like all other vegetables, potatoes should be handled carefully, remembering that they are made up of living tissues and any bruising or injury makes them more susceptible to decay.

Curing immediately after harvesting is the practice which in Missouri most often determines the difference between success and failure in storage of Irish potatoes. Immediately after digging, the potatoes should be picked up and spread out thinly (not more than two potatoes deep) in a driveway, on a shed floor, or some place where the sun will not strike them and where they will get plenty of ventilation.

During this curing the immature and injured potatoes and those which are disposed to decay will become very evident and being spread out thinly can be quickly detected and removed. If the potatoes can be successfully carried through the first month without rot starting, storage during the subsequent months should be successful.

After they are entirely cured, the disease, insect damaged or injured ones should be sorted out for immediate use, and the healthy, sound potatoes should be stored in the coolest place available. Slatted bushel crates make ideal containers for keeping them.

The ideal temperature for storing Irish potatoes is from 36° to 40° F. Extreme care should be taken to avoid frosting as frosted potatoes are very undesirable for eating and they will not keep.

Ventilation is an important item in successful potato storage because

respiration continues through the storage period and, naturally, there must be circulation of air to carry off the excess moisture and carbon dioxide and to supply oxygen to the potatoes.

Potatoes should be kept entirely dark since light turns them green and makes those green portions unfit to eat.

They may be successfully stored in pits, outdoor cellars or caves, in regular storage houses or in basements. The ideal storage temperature for potatoes is just a few degrees warmer than for the root crops although, if other conditions are favorable, they may be kept at the same temperature as the root crops. An ideal way to store potatoes is to put them in slatted bushel crates and stack in such a manner that will permit free circulation of air on all sides.

Onions

The most important consideration in successfully storing onions is to allow them to become fully mature before harvesting. Cure them early and then store them in a dry place. The only onions which should be stored are those which are firm, not readily dented at the neck, thoroughly matured, well-shaped, showing no sprouts or new roots and which are cured and thoroughly dry.

When harvested, the onions should be spread out on the floor of a shed, in a driveway or some shaded place where the sun does not strike them directly and where the air circulates freely in order to give excellent ventilation. After they have become thoroughly cured they may be placed in storage. Slatted crates are ideal containers in which to put them, as the crates can be stacked so as to afford adequate ventilation on all sides throughout the storage period. One common way of storing them is to braid the tops, after they have been

cured and hang them from the top of the storage room or from the rafters of a building.

The most important consideration in successfully storing onions is that they be kept dry. The best temperature is from 30° to 34° F., although if they are kept dry they will keep in temperatures much warmer than this. It is best to prevent freezing, and there should be as little variation in temperature as possible.

Ventilation is important, and a dark place is best since the presence of strong light will cause onions to become green and hasten their sprouting.

Cabbage and Kohl-Rabi

Cabbage and kohl-rabi, which have similar requirements, may be stored together. For storing they should be planted late in the season in order to be in the proper stage of development when time for storing arrives. If properly grown, handled and stored they may be kept throughout the entire winter.

In harvesting for storage, best results are obtained by pulling them leaving the stalks and dirt-free roots attached. This reduces the evaporation of moisture that may occur if the stalk is cut from the head and also lessens the chance of rot developing in the large cut surface.

In placing cabbage in storage the heads may be inverted with the stems and roots up. The second row may be placed on top of the first between the upturned roots and the third row alternating between the roots of the second. By so turning the heads upside down it allows any excess moisture between the leaves to become more evenly distributed and thus lessens the danger of decay. It is not necessary to stand kohl-rabi with the roots up.

These vegetables may be thus stored in pits or in barrels or boxes which

have been buried in the ground. They may also be successfully stored in outdoor cellars, basements or storage houses with the root crops stored in crates on the floor and the cabbage and kohl-rabi placed upon shelves where the humidity is less than on the floor. Oftentimes, cabbage heads are wrapped in paper to avoid excessive moisture loss but this will not be necessary if the humidity of the storage place is sufficient to prevent their drying.

These crops are not injured by a very light freeze if they are allowed to thaw slowly and are not handled during the time they are frozen. The best temperature for storing these crops is just above freezing, from 32° to 40° F. The moisture requirement for successful storage is the same as for Irish potatoes. That is, there should be sufficient moisture to avoid shrivelling but care should be taken to see that no moisture accumulates on the leaves or outside of the crop.

Some ventilation is necessary to carry away the moisture given off in respiration, but the amount of ventilation required is somewhat less with these crops than with potatoes. Light is not an important factor in the storage of these crops. A dark place, however, is preferable.

Pumpkins and Squash

The most important considerations in successfully storing pumpkins and squash are: first, allow them to ripen thoroughly on the vine and, second, store them in a dry fairly warm place that is well ventilated.

They may be harvested any time after the rind becomes hard and before frost.

Pumpkins and squash should be removed from the vines leaving the fruit stalk attached to the fruit. If this stem is removed from the fruit, decay is apt to start at the point of detach-

months, or perhaps longer, for late ment. An excessive evaporation also occurs. Considerable decay in pumpkins and squash may be avoided by dipping them in a solution made of one pint of 40% formaldehyde in six gallons of water.

The best temperature for their storage will range from 40° to 50° F. They should be kept in a dry place with a moderate amount of ventilation. The presence of some light is not harmful to their storage. They may be successfully stored on racks or shelves or in slatted crates in dry storage places.

Apples and Pears

Of the various kinds of fruits grown in Missouri, apples and pears are best adapted to home storage. Generally speaking, apples can be stored successfully for longer periods than pears. It is quite difficult to store either apples or pears that ripen during late August and September for any extended period due to the fact that seasonal temperatures at this time of year, both in storage and outside of storage, are usually quite high. Varieties that ripen in October are much better adapted to usual farm storage. Under good storage conditions, two months would be a good storage season for pears and five

maturing hard apples.

As soon as the fruit is harvested it should be placed in containers so that it can be handled with the minimum of bruising and placed in storage as soon as possible. During this season of the year the air temperatures are usually cooler than the temperatures found in basements, cellars and caves, hence, a temporary storage in an open shed, the north side of a building or some similar place will usually provide cooler temperatures than the caves and cellars. If the fruit is covered lightly with some material such as straw, blankets, etc., the fruit will not absorb the heat of the day and remain cooler than it would if it were not so protected.

When temperatures reach a point where freezing is likely, the fruit should be removed from temporary storage and placed in basement, cave or cellar, and handled in a manner similar to that recommended for root crops. If the individual fruits are wrapped with paper, the fruits will be better protected from bruising and usually will store for a longer period due to the fact that fruits that may start to decay will not contaminate adjoining fruits in the container.

FOOD PRESERVATION I

Member's Name _____ Age _____

Address _____ County _____

Name of Community Club _____

Project Leader _____

Date Project is Started _____ Date Completed _____

Requirements

1. Can at least 10 quarts of tomatoes. (If you are needed to help grow these tomatoes, enroll in the vegetable project. Perhaps you can grow several vegetables.)
2. Can at least 10 quarts of fruit (3 varieties). Wild fruits and berries should not go to waste. Pick and can some of these.
3. Store at least 3 vegetables and 1 fruit if possible.
4. Dry at least 2 vegetables (2 pounds when dried).
5. Serve at least one of the foods you have canned, dried or stored.
6. If sugar is plentiful make 5 glasses of preserves, jams or jellies.
7. Keep the Health Yardstick.
8. Be sure to keep a record of the work you have done and report to the leader. You do not need to write a story unless you wish.

Canning for Others—

Your project group may wish to can for school lunches, a children's home or a sick neighbor.

SUMMARY OF GENERAL CLUB ACTIVITIES

How many project meetings did you attend? -----

How many community club meetings did you attend? -----

What supplementary activity did your club carry? -----

Did you judge articles at local _____ county _____ other
judging contest? -----

Did you demonstrate at County Achievement Day? -----

District or State Round-up? -----

Did you exhibit at local _____ county _____ State Fair _____
Other place _____

Did you attend County Achievement Day? .. Yes _____ No. -----

Did you keep Health Yardstick during the year? -----

Preservation Record

Tomatoes canned qts.

Kinds of fruits canned -----

Kinds of vegetables stored -----

Vegetables stored lbs.

Kind of vegetables dried -----

Vegetables dried (dry weight) lbs.

The family canned _____ qts. I helped can qts.

Helping Others

Did you can for others? -----

How much? -----

Did your club can for others? -----

How much? -----

Do you eat tomatoes more often now? -----

Meals served using canned, stored or dried foods -----

STORY

This space is left so you may include a story if you wish. Tell about the things you have accomplished in this project and in your Community Club. After this record is complete show it to your project leader.

