

HOME PROCESSING OF FRUIT & VEGETABLE

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JUICES

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Foreword

Fruit and vegetable juices are becoming more popular each year.

Valuable in the diet, these juices may be prepared and preserved at home in season at a minimum cost. Because Oregon has an abundant supply of fruits and vegetables which are suitable for juice making, information on home processes should be especially welcome and worthwhile.

The first of its kind in Oregon, this publication presents some simple methods for the home processing of fruit and vegetable juices.

A handwritten signature in cursive script, reading "F. E. Price". The signature is written in dark ink and is positioned above the printed name.

Dean and Director

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HOME PROCESSING OF FRUIT AND VEGETABLE JUICES

by

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Food Technology Department

THE old saying "an apple a day keeps the doctor away" has long emphasized the value of generous portions of fruit in the human diet. Fruits and vegetables contain minerals and vitamins which are well known to be essential in human nutrition.

Because fruits and vegetables are so significant an item in a family's food budget, the advantages of processing fruit and vegetable juices at home has become apparent. The reasons that it is sometimes more desirable to preserve fruits and vegetables in juice form than in other ways are as follows:

► Juices can be prepared from fruits and vegetables which are not suitable for canning or freezing due to sizes, irregularities, or other defects in appearance, but are sound and wholesome as foods. These so-called "substandard" products can be obtained at the lowest possible prices and are frequently obtainable free of cost.

► Aside from dehydrated foods, juices occupy the least storage space as compared to products prepared in other ways from the same amount of raw materials. This is particularly important when the products are frozen and when freezing space is limited.

► Juices can be consumed more readily than other forms of foods. It is much easier to drink three or four apples at a time than to eat them. A more abundant supply of fruits and vegetables in the diet can be achieved if they are consumed in juice form. Some children may refuse to eat certain kinds of fruits and vegetables but will gladly drink their juice in large quantities.

► Preserved juices are very versatile in their uses. They may be consumed "as is" during a meal, as an evening drink, or, in fact, at any time of the day. They may be mixed to make excellent cocktails, punch, and other drinks. They may be used for making jellies, ice cream, sherbets, popcicles, puddings, whips, sauces, gelatin desserts, and gelatin salads.

Types of Juices

Juices may be classified into three types according to the amount of suspended matter which they contain:

Clear juices

This type of juice contains none of the solid portion in suspension. Only a few fruit juices are made under this category. The most common one is clarified apple juice. Some cherry and berry juices are also prepared in this manner.

Clear fruit juices are made commercially by treating the cloudy juice with certain chemicals, letting the sediment settle, and filtering the juice. This method, however, is neither advisable nor convenient to use in small scale home processing. It is usually sufficient for the home processor to allow the juice to stand for several hours or over night in deep containers. The particles of pulp will be collected at the bottom and sides of the containers. The clear juice can then be separated by siphoning or pouring off.

Prolonged standing should be avoided in order that growth of microorganisms and spoilage of flavor will not occur.

Cloudy juices

This type of juice, like the freshly pressed apple juice, contains some of the suspended matter. These are sometimes called natural juices because they are not treated for clarification. The amount of suspended solids and the size of the particles depend largely on the method of straining and the mesh of the straining cloth.

Cloudy juices are highly recommended for home processing as they require no clarifying procedure.

Pulpy juices

This type of juice contains all or nearly all of the solid part of the fruit or vegetable less the skin, seeds, core, and other portions generally considered nonedible. Practically all the vegetable juices are prepared as pulpy juices. The most common one is tomato juice.

Equipment

Many juices, especially those high in acid, should not be brought into contact with metals like iron and copper. Metallic contamination of juices not only changes their color and flavor but robs them of their vitamins and other nutritional values. Use utensils made of glass, porcelain, wood, stainless steel, or aluminum.

Heavily tinned steel utensils may be used if they are not permitted to remain in contact with the juice for more than a few minutes. Wooden spoons should be used for stirring and mixing.

Aside from containers, kettles, and other cooking utensils, the most important equipment needed for the preparation of juices is the juice extractor.

Several types of juice extractors are available to the home processor. Selection of extractors depends on the following factors:

1. The amount of juice to be extracted.
2. The amount of money to be spent in securing this equipment.
3. The presence of a person who can build and operate his own juice extractor.

The following types of juice extractors are recommended for the home processor:

Tapered screw extractor

This is a small hand-operated extractor made of heavily tinned steel. It resembles a meat grinder as shown in Figure 1. The inter-

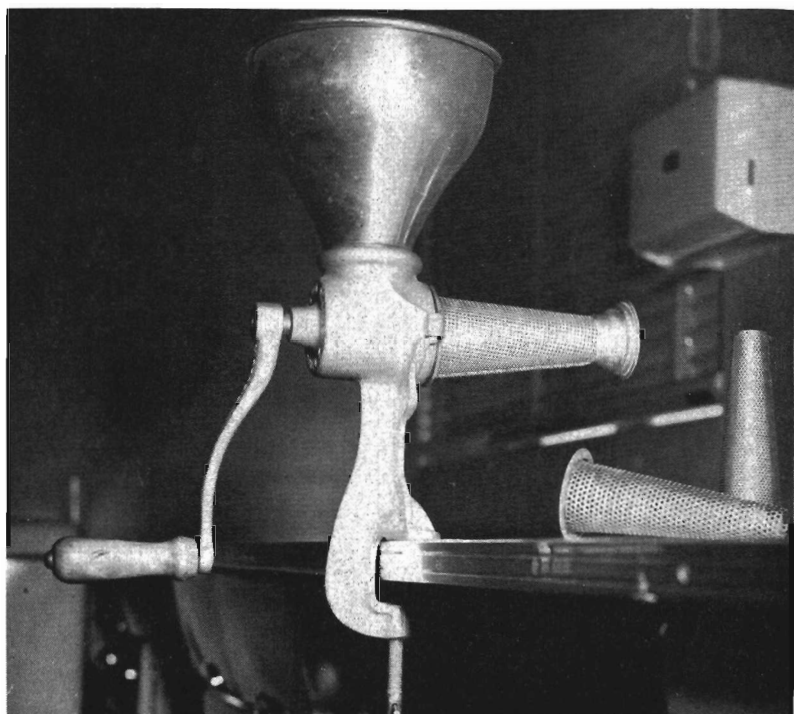


Figure 1. Tapered screw extractor

changeable screens come in different size perforations. The use of a certain mesh screen depends on the type of juice being extracted and the fineness desired. The extractor serves also as chopper or crusher.

Small fruits, such as loganberries and raspberries, which contain no large seeds, can be easily handled through this extractor. Large fruits should be sliced or cut in small pieces before putting into the extractor. Fruits containing stony seeds should have the seeds removed first.

This extractor comes in several sizes. It can be purchased for a few dollars from hardware stores, department stores, and mail order houses.

Electric mixer attachment

Most home electric mixers have the cone-shaped reamer type juice extractor as an accessory. This type of extractor, however, is suitable only for citrus fruits.

A screen type colander, as shown in Figure 2, can be attached to some electric mixers. This type of extractor works like tapered screw type mentioned above, except that it is turned by the motor of the mixer. It is time- and effort-saving, especially when a large quantity of juice is to be extracted.

Liquidizer-blender type

This is a comparatively new type of juice extractor for the home-maker. It utilizes the principle of cutting and whipping the fruit

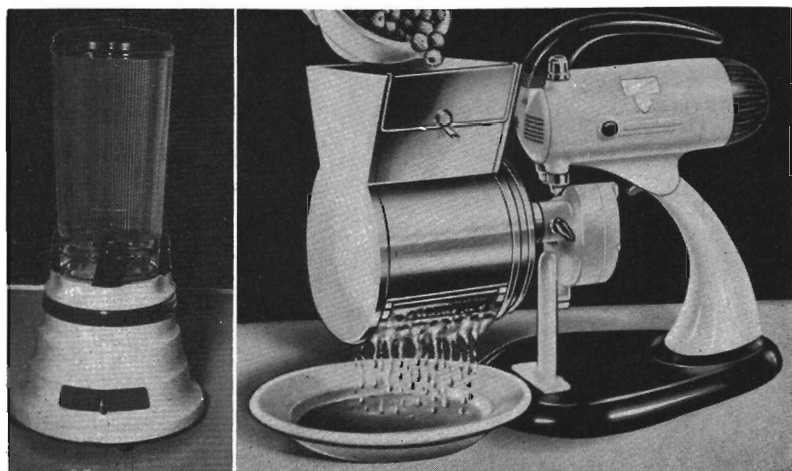


Figure 2. *Left:* Liquidizer-blender juice extractor. *Right:* Electric mixer-colander attachment.

or vegetable at high speed. The appliance has two major parts: the base and the cup, as shown in Figure 2. The base houses the electric motor and is usually finished in acid-resistant white enamel. It has a switch, which is either a single-speed or several-speed type. The varied speed type is, of course, more desirable. At the beginning of the liquidizing process, when the foods are in large pieces, slower cutting is desirable. The high speed whipping is used for finishing.

The cup, which is removable from the base for easy pouring and washing, is made of tempered thick glass. It usually has a quart capacity and is equipped with a plastic cover. At the bottom of the cup there is a set of cutting blades made of stainless steel. These blades spin when the cup is placed over the base and the switch turned on.

The liquidizer is particularly suitable for preparing pulpy juices. Cloudy and clear juices can also be prepared by subsequent straining.

The appliance, though equipped with a small cup, can liquidize a large quantity of fruits and vegetables in a short time because of its high speed operation. Normally it takes but one or two minutes to finish a batch.

The liquidizer-blender is also useful for whipping cream, beating eggs, making milk shakes, and blending cocktails and mixed drinks. It is available through department stores and mail order houses for from \$20 to \$40.

Nutcracker type

This is the most simple and least expensive type of juice extractor. It can be easily made by any handyman at home from the diagram shown in Figure 3.

Cut two boards 24 to 30 inches long from 1" x 8" hardwood lumber. Cut two reinforcement pieces 3" x 8" from the same stock. Screw one reinforcement piece to the end of each board. Drill two holes approximately one-half inch in diameter at the positions indicated. Loosely hinge the boards by tying them through the holes with a piece of rope. The rope should be long enough so that it may be adjusted to fit the bulk of bag. Trim the other end of the boards to make handles.

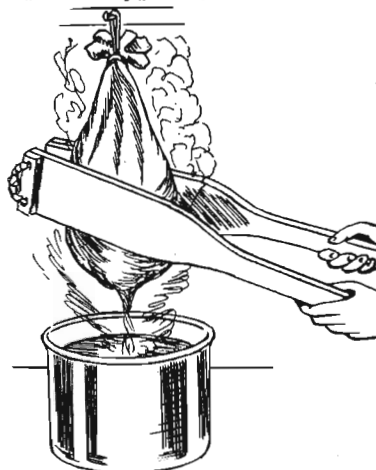


Figure 3. Nutcracker-type juice extractor.

In using this hand press the fruit should first be crushed, cut, or cooked if necessary according to the directions given in the detailed procedures and then put into a bag made of linen or several thicknesses of cheesecloth (a sugar or flour cloth bag is, in many cases, suitable for this purpose). The bag is suspended with a rope and squeezed with the nutcracker press. The press is held tight until little or no juice runs out of the bag. The press is removed, and the fruit loosened up inside the bag. The operation then is repeated several times until virtually no juice runs out of the bag.

The nutcracker extractor is suitable only when small quantities of juice are to be extracted. Because of its simplicity of construction and low cost, it is a desirable tool to have around the house.

Screw press

If larger quantities of juice are to be extracted, a screw type orchard press can be bought or built at home. This type of press can handle a bushel or more of fruit at a time.

The screw-type press is sometimes called a barrel press because it consists of a barrel-like compartment which has no top or bottom. The barrel is made of hardwood staves spaced approximately one-quarter of an inch apart. It is placed at a desirable height on a thick board supported by a heavy frame. The board has a round groove slightly larger than the barrel.

On one side of the board the groove extends all the way to the edge of the board to facilitate drainage of the juice. A heavy screw with ratchet is supported above the barrel by the frame. Figure 4 illustrates the construction of a screw press.

The dimensions of the press depend on the amount of fruit to be handled. A barrel that will take from half to one bushel of fruit is considered as a desirable size for this type of press. Other parts of the press should be in proportion to the size of the barrel. The screw press is obtainable through hardware or farm equipment stores. If not available, it can be built by anyone with some knowledge of carpentry.

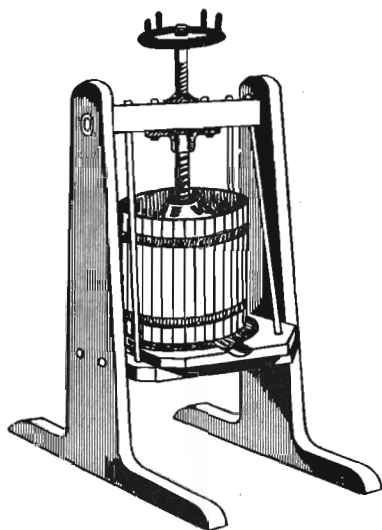


Figure 4. Screw press.

In using this press, the fruit is first ground in a food grinder or crushed in a crusher and then put in a bag made of coarse cloth. The bag is placed in the barrel and the screw turned down.

Small hydraulic press

For even larger quantities of fruit, a small hydraulic press can be built utilizing a hydraulic automobile jack. This method uses greater pressure and, consequently, obtains a larger yield of juice.

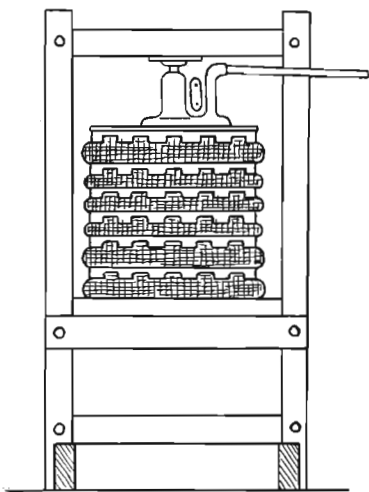


Figure 5. Small hydraulic press using an automobile jack.

Furthermore, the operation is easy and speedy. Several bushels of fruit can be pressed in an hour.

The small hydraulic press may be purchased from hardware or farm equipment stores, or it can be constructed by any experienced carpenter. The construction of this press is similar to the screw press mentioned above except that instead of the ground fruit being placed in the barrel it is placed in press cloths forming cheeses and separated by racks made of hardwood slats. These are placed alternately with the cheeses. The screw in the screw press is replaced by a hydraulic automobile jack of 1 or 1½ ton capacity.

A diagram of the hydraulic press is shown in Figure 5.

General Procedure

The rules of good housekeeping should be strictly applied to the preparation and preservation of fruit and vegetable juices.

- Cleanliness is the most important prerequisite in the successful processing of good quality juices. The room where the juices are to be prepared should be free from flies, ants, dust, and other foreign matter. The work table or counter should be scrupulously clean. The utensils should be washed immediately before use. If soap or detergent is used, utensils and equipment should be rinsed with abundant warm water until no soapy odor remains.

- Quick handling is also important in the processing of juices. Crushed or ground fruit and fruit juices are easily oxidized by air. Oxidation causes change of flavor, a darkening of color, and loss of vitamins, particularly Vitamin C. Light colored juices are darkened by oxygen in the air and develop undesirable flavors.

For this reason, crushed fruits and fruit juices should not be allowed to stand for any length of time. They should be handled rapidly from step to step until the entire process is completed. If delay is absolutely necessary, the crushed fruits and fruit juices should be kept covered and placed in a refrigerator or in a cool place and the operation resumed as soon as possible.

- Selection of fruits and vegetables for juice making is the primary controlling factor in making juice. Processing does not improve the quality of the juice originally present in the fruit or vegetable. In fact, any amount of handling or processing impairs the original quality accordingly. Good juices can be obtained only by using good fruits or vegetables with which to start. They should have the full flavor of the type they represent and should be of the proper maturity. Any injured fruits or vegetables should be trimmed or discarded. Wormy, moldy, and decayed material should not be allowed to go into the juice. A few bad fruits or vegetables can impart an undesirable flavor and thus ruin the entire batch of juice. Overripe fruit lacks character and should not be used for juice making.

Defects due to size, shape, and appearance are not so important in juice processing.

- Blending of different varieties sometimes gives desirable flavors, especially in fruits like apples. Sweet and sour varieties of apples mixed together nearly always make better apple juice than either one alone. The amount of each variety used depends on the taste of each. The homemaker is advised to learn the preferences of her family members and blend the varieties accordingly.

In fruit juices, a very important taste factor is the degree of sweetness and sourness, known as the sugar-acid ratio. Some people like it on the sweet, some like it on the sour side. It is said that in general women like sour food, while men and children like sweet tastes. Most berry juices are too sour for anybody and sugar should be added to balance. In processing a batch of fruit juice, it is advisable to make it on the sour side. If a sweeter taste is desired by any member of the family, sugar can be added just before the juice is served or consumed.

One advantage of processing juices at home is that they can be tailor-made to suit the individual family's taste. The commercially

prepared juices are mass-produced to fit the majority of people's taste.

The preparation and blending of juices is a culinary art. By observing the important points mentioned above and following the procedure below, satisfactory results should be obtained.

Washing

Fruits and vegetables should be thoroughly washed with plenty of fresh water. Inasmuch as they are not peeled for processing as in canning and freezing, the surface should be perfectly clean. The calyx and stem ends of fruits like apples collect dirt. The dirt should be removed completely. Rough-skinned root vegetables like carrots should be scrubbed with a brush.

Careful washing usually results in a clean flavor and appearance of the final juice. It also facilitates the preservation, as it reduces contamination.

Crushing

Crushing or grinding before pressing is necessary if the greatest yield of juice is to be expected. A heavily tinned food grinder or chopper can be used for this purpose. Small quantities of soft fruits like grapes and berries can be crushed by hand with a wooden spoon. When using the tapered screw type or the liquidizer-blender type extractor, crushing and extracting are done in one operation. No separate procedure is required. Large fruits and vegetables, however, should be cut or sliced before putting into the extractor.

Pressing

Two methods of pressing are used; namely, cold and hot. In using the cold pressing method, the fruits should be pressed immediately after they are crushed or ground. Delaying impairs the color and flavor as described above. The hot pressing method, as its name implies, utilizes heat. It is especially suitable for fruits with thick juice. Heating thins down the juice and releases it from the pulp. In addition, heating extracts the color, flavoring matter, and acid present in the skins of fruits like red grapes.

In heating the fruit, care must be taken not to burn it. Overheating burns the sugar present in the fruit and imparts a "scorched" taste. Heating in the upper part of a double boiler is desirable. If the regular double boiler is too small, any utensil can be converted into a double boiler by placing it into a larger utensil, such as a dish pan, filled with water. Heat the water to boiling, and keep it at the boiling temperature while the fruit is in the upper part of the boiler.

Stir the fruit regularly until it reaches 140° to 160° F. Remove the fruit and press immediately while it is still hot.

If a double boiler is not available or if it is found to be too slow, the fruit can be heated in a utensil directly over a flame or hot plate. Turn the heat down low, stir the fruit constantly to prevent it from scorching. Do not boil the fruit.

To obtain a very best yield, small fruits, such as the berries, should be pressed after freezing and thawing wherever possible. The process of freezing and thawing breaks down the cells of the fruit and releases the juice.

Treating

To preserve the flavor, color, and general quality of a juice, the following treatments are available to the homemaker:

Addition of sugar. As mentioned above, some juices, such as berries, contain much natural fruit acid and are too sour for the average palate. Sugar should be added to balance the flavor. When present in proper ratio, sugar and acid produce a pleasing, refreshing taste. The amount of sugar to be added depends on the type of juice, the maturity of the fruit from which the juice is extracted, and the individual family's taste. The approximate amount of sugar to be added will be mentioned under each juice type below.

The homemaker is again reminded to prepare the juice on the sour side if there is a variation of taste buds among the members of the family. Sour juices can be conveniently sweetened even up to the time of consumption. Over-sweetened juices will be more difficult to correct, although lemon juice or citric acid can be used to increase the sourness of a juice.

Addition of ascorbic acid. Ascorbic acid, commonly known as Vitamin C, has the property of retarding color and flavor changes in a fruit juice. It is especially helpful in the preparation of light colored juices, such as apple.

Ascorbic acid in powder form can be obtained from drug stores, frozen food locker plants, and some grocery stores. It should be used at the rate of one-half teaspoonful to two gallons of juice. Add the ascorbic acid to the juice immediately after pressing. Stir until dissolved. To facilitate solution, it is desirable to dissolve the ascorbic acid in a small quantity of juice in a glass vessel such as a pitcher, then mix it thoroughly with the entire batch.

Addition of sodium benzoate. Sodium benzoate, also known as benzoate of soda, is a chemical preservative which is permitted by law to be added to fruit juices at the rate of not to exceed one-tenth of 1 per cent to preserve them temporarily. It is used commercially

to preserve apple juice while holding for sale in the food markets. Untreated apple juice usually begins to ferment in 24 hours when held at room temperature. Juice treated with sodium benzoate, on the other hand, will keep for two or three weeks at cool temperatures, and for longer periods in a cold refrigerator.

Homemakers who find it necessary or desirable to preserve fruit juices in this manner can purchase benzoate of soda from drug stores. It should be used at the rate of 0.1 per cent, which is approximately equivalent to two teaspoonfuls per gallon of juice. It is advisable to determine the number of gallons of juice to be treated in this fashion and to have the druggist weigh out the exact amount of sodium benzoate.

Do not add sodium benzoate directly to the juice. Thoroughly dissolve it in a small amount of warm water before adding to the juice.

Sodium benzoate will not preserve vegetable juices.

Straining

The homemaker will not find it necessary to strain many juices which she prepares for her family's use. However, clear juices and some others containing seeds, bits of peel, etc., should be strained.

Straining the juice through cheesecloth is a convenient method. Use coarse cheese cloth for rough straining and fine cloth for finishing. If fine cheesecloth is not available, two or more thicknesses of the coarse cloth will accomplish the same purpose. Muslin or flannel can also be used for fine straining.

To speed up the straining procedure it is desirable to make the cloth into a bag which is tapered at the bottom. Hang the bag on a rack as shown in Figure 6.

Preserving

Fruit and vegetable juices may be preserved by freezing or

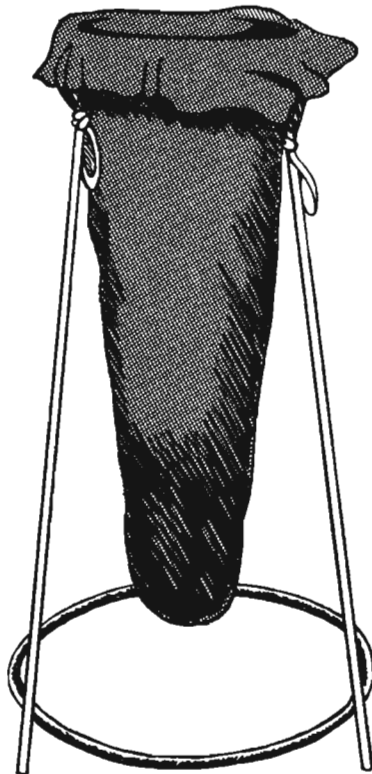


Figure 6. Straining bag suspending on a rack.

heating. Freezing preservation is simpler and easier than heating if home freezer or frozen food locker space is available. Preservation by heating requires more work and equipment. Once it is accomplished, the juice can be safely kept at ordinary room temperature. No freezing space is required.

1 *Freezing.* Several types of containers can be used for freezing juices. Any strong round glass bottles, jars, or glass jugs with tight covers or caps are suitable. Tin cans can also be used. For fruit juices, acid-resistant enamel-lined cans are necessary. Paraffin-coated or cellophane lined water-tight paper cartons similar to those used for frozen foods are also satisfactory. If the juice is extracted by the cold method, heat it to 170° to 175° F. In freezing juices it is important to cool the juice down to room temperature before filling the containers. The containers should not be filled to the top. About 10 per cent of the total space should be allowed for the expansion of the juice during freezing. If sufficient head space is not provided, the containers may burst. Keep the freezer at 0° F., or colder, all the time.

2 *Heating.* Two methods of preserving juice by heat are used: pasteurization and sterilization. Pasteurization uses lower temperatures and is applicable only to fruit and some acid vegetable juices such as tomato and sauerkraut. Sterilization requires higher temperatures and is usually accomplished in a pressure canner. Nonacid vegetable juices are heat-preserved in this manner. If a pressure canner is not available, nonacid vegetable juices can be acidified by blending with acid juices, and the juice can be preserved at boiling water temperature or lower. Details of this method will be given under each juice type.

Fruit and acid vegetable juices can be pasteurized in bottles, preferably with screw type caps. Fill the bottles at room temperature, allowing headspace for expansion during heating. Screw the caps on loosely. Place the bottles in a large pot or wash boiler. To avoid heating the bottles directly, place a large towel or a wood-slatted rack on the bottom of the pot before putting in the bottles. Adjust the amount of water in the pot until the water line is just above the juice line. Heat the water, and stir occasionally. Observe the temperature of the juice regularly by removing the cap of a bottle and inserting a clean thermometer into the juice. Remove the bottles from the water when the temperature of the juice (not water) reaches 170° to 175° F. Screw the caps down tight and place the bottles on their sides.

An alternate method for preserving juices is to can them like canning fruits. The homemaker may find this method much simpler

and more along the line of her accustomed canning procedure. Fill the juice cold into tin cans or glass jars, leaving about one inch headspace. Leave the lids loose and sterilize them in the water bath. Boil the water gently and maintain at boiling temperature during the entire period of sterilization. Sterilize for 15 minutes for No. 2 cans and pint jars, and 20 minutes for No. 2½ cans and quart jars. Seal the lids after heating.

Nonacid vegetable juices which require pressure sterilization should be first heated to 160° to 180° F. and poured into glass jars or tin cans while hot, leaving a half-inch headspace. This preheating procedure is required in order that air may be exhausted. Seal the cans or jars and sterilize them in a pressure canner according to the directions given in the "Detailed Procedures." Take every precaution in operating the pressure canner as you would in canning vegetables and meats.

Detailed Procedures for Processing Fruit Juices

Apple juice

- 1 Mix sweet and sour varieties of apples together according to individual taste. Apples should be ripe, but on the firm side.
- 2 Wash the apples thoroughly.
- 3 Slice them into halves or quarters.
- 4 Crush the sliced apples in a food grinder or chopper.
- 5 Press in a nutcracker type, barrel, or hydraulic press, depending on the quantity of juice to be pressed and the equipment available.
- 6 If possible, add one-half a teaspoonful of ascorbic acid to every two gallons of juice. Stir to dissolve the ascorbic acid.
- 7 Strain the juice through cheesecloth if necessary.
- 8 Preserve the juice either by freezing, canning, or pasteurizing to 170° to 175° F. Use the methods described under the heading "preserving."
- 9 If the apple juice is to be preserved temporarily with sodium benzoate, follow the instructions under "treating."

Grape juice

- 1 Concord is the variety most commonly used for grape juice. Select fully ripe grapes for best results.
- 2 Wash the grapes carefully.
- 3 Remove the stems.

- 4 Crush the grapes in a grinder, chopper, or other type of crusher.
- 5 Press the crushed grapes in a nutcracker type, barrel, or hydraulic press. Use the hot press method described under "pressing."
- 6 Strain the juice if necessary.
- 7 Preserve the juice by freezing, canning, or pasteurizing to 170° to 175° F., using the methods described under "preserving."
- 8 After the juice stands for several weeks (the time depending on the temperature of the storage room), a sediment containing cream of tartar will settle down. This sediment, naturally present in grapes, can be separated by straining the juice through muslin or flannel cloth immediately before use or by repeating the straining and preserving procedures (6 and 7 above) for further storage.

Berry juices

- 1 This procedure is applicable to all types of berries, such as loganberry, blackberry, boysenberry, red and black raspberry, youngberry, gooseberry, and currant. Almost all varieties of berries are suitable for juice making. Use fully ripe berries for best flavor and color.
- 2 Wash the berries carefully.
- 3 Extract the berries with any of the extractors described above. Strain through cloth if necessary. Berry juices can also be made into a pulp style product. In this method, run the berries through a tapered screw press or a colander. The pulpy juice, however, will not retain its quality as long as the pressed juice, due to the fact that it is more difficult to remove the air entrapped in the pulp.
- 4 Berries will yield more juice if they are frozen and thawed before pressing. If freezing facilities are available, the homemaker should by all means take the advantage of this freezing procedure, which will not only release more juice but will make the pressing procedure easier and give a clearer juice.

When packing berries for freezing, mix them with granulated sugar in the ratio of 1 part sugar to 10 parts berries by weight. Fill into moisture-vapor proof paper cartons or enameled tin cans and place them in the freezer.

The purpose of mixing sugar with berries for freezing is to retain the color and flavor of the berries. Sugar forms

a protective coating outside the berries, thus preventing the berries from coming into contact with air.

If the juice made from the frozen berries is not sweet enough, additional sugar can be used later to attain the desirable sugar-acid balance.

When thawing the berries for pressing, keep them in the original containers to avoid contact with air. If possible, thaw the berries in a cool place or in the refrigerator.

- 5 Thawed berries can be pressed or made into pulpy juice in the manner of the fresh berries described above.
- 6 Berry juices can be preserved by freezing, canning, or by pasteurizing to 170° to 175° F. Pulpy juice should be pasteurized to 180° to 185° F. The additional heat will serve to drive as much air out of the pulp as possible.

Pear juice

- 1 Use ripe pears of the Bartlett variety for best flavor.
- 2 Peel, cut into halves, and remove the core.
- 3 Pear juice can be prepared only in the pulpy style. Pulp the pear halves in a tapered screw press or a liquidizer-blender. Small quantities of pears can be crushed by wooden spoons.
- 4 Add one-half teaspoonful of ascorbic acid to every two gallons of juice to preserve the color. This procedure, however, is not necessary if the pears are handled rapidly.
- 5 Prepare a syrup by dissolving one cup of sugar in three to four cups of water, depending on the sweetness desired. Mix the pear pulp with an equal volume of the syrup. Do not add dry sugar directly to the pear pulp, as it will be difficult to dissolve.
- 6 Preserve the pear juice by freezing, canning, or by pasteurizing to 185° to 190° F.
- 7 Pear juice may not be as well liked as some of the other juices when consumed "as is" but it makes an excellent drink with vanilla ice cream prepared by beating the two together like milk shake. Pear juice also makes delicious milk sherbets when mixed with an equal volume of milk and then frozen. Sugar may be added if desired.

Plum juice

- 1 Use fully ripe, slightly soft plums. Fruit with good color is usually high in flavor also. It makes the best juice.
- 2 Wash the plums.
- 3 Cut in halves and remove the pit.

- 4 Due to its heavy consistency, plum pulp should be pressed hot. Use the method recommended under "pressing." Add one pint of water to each pound of fruit before heating. If the pulp is still too thick, more water can be added.
- 5 Sweeten the juice to desired taste. One-quarter to one-half cup of sugar to each cup of juice should be about right.
- 6 Strain juice through cheesecloth if necessary.
- 7 Preserve the juice by freezing, canning, or by pasteurizing to 170° to 175° F.

Cherry juice

- 1 Use sour varieties of cherries such as Montmorency. A blend of sweet and sour varieties will also produce a desirable product.
- 2 Wash the cherries and remove the stems.
- 3 Press the cherries. It is not necessary to remove the pits. The pit of cherries provides a characteristic almond flavor to the juice which is enjoyed by many. If the pit flavor is not wanted, remove the pits before pressing.
- 4 Strain through cloth if necessary.
- 5 Preserve the juice by freezing, canning, or by pasteurizing to 170° to 175° F.

Blended fruit juices

Blending of fruit juices is a culinary art. The homemaker should take pride in developing her own recipe of blending. Some fruit juices, like apple and berry, lend themselves very well to blending with other juices, resulting in delicious exotic drinks.

Blending may be done before the juices are preserved, or it may be done with individually preserved juices just before serving.

Serving the blended juice with ice, a slice of fresh lemon, a few drops of lemon juice, or a few mint leaves will greatly improve the flavor of the drink. Carbonated water, ginger ale, and other carbonated beverages blend well with iced fruit juices. The homemaker can do a little experimenting and create her own blend to try out on her guests.

The following blended juices are offered for suggestions:

- *Apple-berry.* Use two to four parts of apple juice to one part of berry. Berry juices of higher acidity (such as loganberry and currant) require more apple juice than those of lower acidity (blackberry, raspberry, etc.). Sugar may be added to improve the sugar-acid balance if desired.

If the juice is to be preserved after blending, freeze, can, or pasteurize it to 170° to 180° F.

- *Apple-cherry.* One part of cherry juice should blend well with one to two parts of apple juice. No sugar is needed unless exceptional sweetness is desired.

Preserve by freezing, canning, or pasteurizing to 170° to 180° F.

- *Apple-plum.* An equal volume of each makes a fine blend. Sugar may be added if the original juices are too sour. Preserve as above.
- *Grape-berry.* Use equal parts of each if the berries are of the low acidity type. Use two to three parts of grape with one part of berry if the latter is high in acidity. Preserve as above.

Detailed Procedures for Processing Vegetable Juices

Tomato juice

- 1 Use fully ripe, deep red, tomatoes for the best flavor and color.
- 2 Trim off all green, yellow, and black areas. Cut out the stem end, and remove all the green material. Remove also any rotted and damaged spots. This procedure is important in determining the quality of the final product. The color and flavor of the tomato juice depend on how completely these undesirable parts are removed.
- 3 Quarter the tomatoes. Small ones can be just halved.
- 4 Heat to boiling. Stir constantly.
- 5 Run through a tapered screw press, or strain through a sieve, colander, or a piece of aluminum screen. The mesh of the screen determines the smoothness of the juice.
- 6 Add a little salt to taste. Approximately two tablespoonfuls per gallon should be about right.
- 7 Preserve the juice by freezing, canning, or by heating to 190° to 200° F.

Rhubarb juice

- 1 Use tender, juicy stalks of the red variety of rhubarb.
- 2 Wash thoroughly.
- 3 Cut the stalks into pieces.
- 4 Heat to boiling two quarts of water with each 10 pounds of rhubarb.
- 5 Extract while hot in any of the extractors mentioned above.
- 6 If necessary, strain through cloth.

- 7 Sweeten to taste. One pound of sugar per gallon of juice should be about right.
- 8 Preserve by freezing, canning, or pasteurizing to 165° to 175° F.
- 9 Rhubarb juice blends very well with many fruit juices, especially those of low acidity, such as the sweet varieties of apples and cherries.

Sauerkraut juice

- 1 Sauerkraut has always been considered a wholesome and healthful food, and its juice contains approximately the same nutritive qualities including from 1 to 2 per cent of digestible organic acid. The organic acid is essential in a balanced human diet. Excess sauerkraut juice is always present in vats or barrels of sauerkraut. If sauerkraut is prepared at home, the homemaker should take advantage of the nutritious sauerkraut juice, and preserve it for future use instead of discarding it. Sauerkraut juice is also obtainable from commercial kraut packers on the "come-and-get-it" basis. The packers usually have excess sauerkraut juice in their vats and are glad to get rid of it. The homemakers who are interested in this juice should contact local kraut packers for obtaining the juice for processing.
- 2 Sauerkraut juice can be processed "as is." It requires no additaments of any kind.
- 3 Preserve the juice by freezing, canning, or by pasteurizing to 160° to 170° F.
- 4 Sauerkraut juice can be consumed straight or be blended with other juices as indicated below.

Carrot, celery, beet, and turnip juices

- 1 These are nonacid vegetables. They make nutritious and flavorful juices and blend very well with each other, as well as with tomato juice and sauerkraut juice.
- 2 Wash the vegetable until free of soil. Scrub with brush if necessary.
- 3 Cut into small pieces and run through a food grinder. Hard vegetables should be finely ground before pressing to obtain the maximum yield of juice. An alternate method is to cook the vegetables until soft before pressing.
- 4 Extract with any of the extractors described above. Strain through cloth if necessary.
- 5 Preserve the juices by freezing or by heating. This group of vegetables is low in acidity and, if not preserved by freezing,

- should be blended with acid juices (as suggested below under "blended vegetable juices") or should be sterilized in a pressure canner similar to canning nonacid vegetables and meats.
- 6 To sterilize the juice, first heat it to 160° to 180° F. in order to expel the air. Since these juices contain little sugar, they can be heated directly over a low flame or hot plate instead of using a double boiler. Stir constantly while heating.
 - 7 Pour the juice hot into tin cans or glass jars, leaving about $\frac{1}{2}$ inch headspace. Seal the cans or jars.
 - 8 Sterilize in a pressure canner at 10 pounds pressure for 30 minutes.
 - 9 Cool in air.

Blended vegetable juices

Vegetable juices, like the fruit juices, can be blended in any way and in any proportions, according to preference. They can be blended before preserving or just before consuming. The homemaker can develop her own recipes for blending as she can with fruit juices. When preserving blended vegetable juices by heating, the general rule is to follow the directions given for the juice which constitutes the major part of the blend. For example, if more than half of the blend is nonacid vegetables, the product should be sterilized in a pressure canner.

The following recipes are offered as suggestions:

- *Tomato-sauerkraut.* Four parts tomato juice blended with one part sauerkraut juice. Preserve like tomato juice.
- *Sauerkraut-carrot.* Equal parts of sauerkraut juice and carrot juice. Preserve by freezing, canning, or by pasteurizing to 190° to 195° F.
- *Sauerkraut-celery.* Equal parts of sauerkraut juice and celery juice. Preserve by freezing, canning, or by pasteurizing to 190° to 195° F.
- *Sauerkraut-carrot-beet-turnip.* One part of sauerkraut juice and one part of combination of carrot, beet, and turnip juices. Preserve by freezing, canning, or by pasteurizing to 190° to 195° F.
- *Tomato-sauerkraut-celery.* Four parts tomato juice blend with one part of sauerkraut-celery juice. Preserve like tomato juice.
- *Tomato-sauerkraut-celery-carrot-beet-turnip.* Three parts of tomato juice blend with one part of sauerkraut juice, and one part of a combination of celery, carrot, beet, and turnip juices. Preserve like tomato juice.