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BASICS OF JELLY MAKING

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Jellied Products

- **Jellies** are usually made by cooking fruit juice with sugar. Jelly should be clear or translucent and firm enough to hold its shape when turned out of the container.
- **Jams** are thick, sweet spreads, which will hold their shape, but are less firm than jelly. They are made from crushed or chopped fruits and sugar.
- **Conserves** are jams made from a mixture of fruits, especially when they include citrus fruits, nuts, raisins or coconut.
- **Preserves** are made of small, whole fruits or uniform-size pieces of fruits in a clear, thick, slightly jellied syrup.
- **Marmalades** often contain citrus fruits and are soft fruit jellies containing small pieces of fruit or peel, evenly suspended in the transparent jelly.

Common Ingredients

For proper texture, jellied fruit products require the correct combination of fruit, pectin, acid and sugar.

Fruit: Fruit gives each spread its unique flavor and color. It also supplies the water to dissolve the rest of the necessary ingredients and furnishes some or all of the pectin and acid. Good-quality, flavorful fruits make the best jellied products. Commercially canned or frozen fruit preserved in its own juice may be used to make jellied products, but pectin must be added. If you preserve your own fruit, use ¼ slightly under-ripe and ¾ fully ripe fruit. Preserve the fruit in its own juice and note how much sugar is added to allow for that in the jelly recipe.

Homemade blueberry jam.
Adair Hoover, Clemson HGIC.

Pectin: Pectin is a substance in fruits that forms a gel if it is in the right combination with acid and sugar. All fruits contain some pectin, but some must be combined with fruits high in pectin or with commercial pectin products to obtain gels. Because fully ripened fruit has less pectin, one-fourth of the fruit used in making jellies without added pectin should be under-ripe. The use of commercial pectin simplifies the process, but jelly made without added pectin contains less sugar and tastes fruitier. Follow the manufacturer's directions for using commercial pectin and do not interchange liquid and powdered pectins.

Acid: The proper level of acid is critical to gel formation. If there is too little acid, the gel will never set; if there is too much acid, the gel will lose liquid (weep). For fruits low in acid, add lemon juice or other

acid ingredients as directed. Commercial pectin products contain acids that help to ensure gelling.

Sugar: Sugar serves as a preserving agent, contributes flavor and aids in gelling. Granulated white sugar is the usual type of sugar for jelly or jam. Corn syrup and honey may be used to replace part of the sugar in recipes, but too much will mask the fruit flavor and alter the gel structure. Use tested recipes for replacing sugar with honey and corn syrup. Do not try to reduce the amount of sugar in traditional recipes. Too little sugar prevents gelling and may allow yeast and mold growth. Tested recipes must be used to make jellies without added sugar, and these products usually must be stored in the refrigerator or freezer.

Pectin & Acid Content of Common Fruits Used to Make Jelly

Group I: If not overripe, has enough natural pectin and acid for gel formation with only added sugar – Apples (sour), Blackberries (sour), Crabapples Cranberries, Currants, Gooseberries, Grapes (Eastern Concord), Lemons, Loganberries, Plums (not Italian), Quinces

Group II: Low in natural acid or pectin and may need addition of either acid or pectin – Apples (ripe), Blackberries (ripe), Cherries (sour), Chokecherries, Elderberries, Grapefruit, Grape Juice, bottled (Eastern Concord), Grapes (California), Loquats, Oranges

Group III: Always needs added acid, pectin or both – Apricots, Blueberries, Figs, Grapes (Western Concord), Guavas, Peaches, Pears, Plums (Italian), Raspberries, Strawberries

Equipment & Containers

- A large 8- or 10-quart saucepan is recommended because jellies and jams have a tendency to boil over. A heavy metal is best because it allows even heat distribution.
- A jelly bag or suitable cloth is needed when extracting juice for jelly. Firm unbleached muslin or cotton flannel with the napped side turned in, or four thicknesses of closely woven cheesecloth may be used. Jelly bags or cloths should be damp when extracting the juice.
- A jelly, candy, or deep-fat thermometer can be used to determine doneness in jellied products without added pectin.
- A boiling water bath canner is necessary for processing all fruit spreads. A deep cooking pot with a rack may be used for a canner if it's deep enough for one or two inches of boiling water above the tops of jars. Be sure the pot has a close-fitting lid.

Preventing Spoilage of Jellies

Even though sugar helps preserve jellies and jams, molds can grow on the surface of these products. Research now indicates that the mold people usually scrape off the surface of jellies may not be as harmless as it seems. Mycotoxins have been found in some jars of jelly having surface mold growth. Mycotoxins are known to cause cancer in animals; their effects on humans are still being researched. Because of possible mold contamination, paraffin or wax seals are no longer recommended for any sweet spread, including jellies.

All jellied products should be processed in a boiling water bath to prevent mold growth. To process in a boiling water bath, pour the boiling product into a hot sterilized canning jar, leaving ¼-inch head-space. Wipe the jar rim, and close with a treated canning lid and screw band. Place on a rack in a canner filled with boiling water. The water should cover the jars by at least one inch. Cover the canner. Bring the water back to a boil; boil gently for 5 minutes. Remove the jars to a protected surface and cool, away from drafts, undisturbed for 12 hours.

General Procedures for Making Jams, Preserves & Marmalades

1. Use half-pint canning jars and pretreated lids.
2. Check jars and lids. Discard any cracked or chipped jars and any lids with blemished sealing surfaces. Wash in hot, soapy water; rinse. Boil jars for 10 minutes to sterilize. Keep jars hot.
3. Wash and rinse all fruits thoroughly before cooking. Do not soak. For best flavor, use fully ripe fruit when making jellied products with added pectin. For recipes without added pectin, use just-ripe fruit. Remove stems, skins and pits from fruit; cut into pieces and crush. For berries, remove stems and blossoms and crush. Seedy berries may be put through a sieve or food mill.
4. Combine ingredients and cook in small batches, one recipe at a time, in a large, heavy, 8- to 10-quart saucepot.
5. Stir fruit mixture over low heat until sugar dissolves. Then boil rapidly for a clear-finished product. As the fruit mixture begins to thicken, stir frequently to prevent sticking and scorching.
6. If not adding pectin, test for doneness using one of the methods described below. For a softer product, shorten the cooking time; for a firmer product, lengthen it.
7. If liquid or powdered pectin is used, follow manufacturer's directions. The method of combining ingredients varies with the form of pectin used. Pectin, acid and doneness tests are not necessary with added pectin. For a softer product, use ¼ to ½ cup more fruit or juice. For a firmer product, use ¼ to ½ cup less fruit or juice.
8. Before filling jars, skim off foam that forms from the boiling process. The addition of ¼ teaspoon butter or margarine during cooking helps cut down on the foam formed.
9. To fill the jars, pour hot fruit mixture into hot sterilized jars, leaving ¼-inch headspace.
10. Process jams, preserves and conserves in a boiling water bath for the length of time specified in the recipe. If no processing instructions are given, process for 5 minutes in sterile jars. If jars have not been sterilized, the filled jars should be processed 10 minutes, but the added 5-minutes processing time may cause weak gels, especially if using low-pectin fruits.
11. Allow to cool undisturbed for 12 hours, then remove screw bands, carefully wipe the outside of the jar with a clean, damp cloth, and store in a dark, dry, cool place. The shorter the storage time, the better the product.

Altitude Adjustments: The processing times given for processing jellied fruit products are for altitudes of 0 to 1000 feet. Most areas in South Carolina will fall within these altitudes. Add 1 minute of processing and sterilizing time for each 1000 feet of additional altitude.

Making Jellies Without Added Pectin

To Extract Juice: Use only firm fruits naturally high in pectin. Select a mixture of about three-quarters ripe and one-quarter under-ripe fruit. Do not use commercially canned or frozen fruit juices; their pectin content is too low. Wash all fruits thoroughly before cooking. Crush soft fruits or berries; cut firmer fruits into small pieces. Using the peels and cores adds pectin to the juice during cooking. Table 1 provides instructions and proportions for extracting juice from specific fruits. Put fruit and water (as instructed) in a large saucepan and bring to a boil. Then simmer according to the times in Table 1 or until fruit is soft. Stir to prevent scorching. One pound of fruit should yield at least 1 cup of clear juice.

When fruit is tender, strain through a colander, then strain through a double layer of cheesecloth or a jelly bag. Allow juice to drip through, using a stand or colander to hold the bag. Pressing or squeezing the bag or cloth will result in cloudy jelly.

To Make Jelly: Use no more than 6 to 8 cups of extracted fruit juice at a time. Double batches do not always gel properly.

1. Measure juice and sugar. When a recipe is not available, try using ¾ cups sugar for each 1 cup of juice. Put juice into a large saucepan and bring to a boil.
2. Add sugar to juice. Add lemon juice or citric acid if additional acid is required.
3. Test for doneness as instructed below.
4. Remove jelly from heat; quickly skim off foam.
5. Pour quickly into hot jars, leaving ¼-inch head space. Wipe jar rims, adjust lids and process in a boiling water bath for 5 minutes.

Testing Pectin in the Juice

For jellies made without pectin, it is important to know whether there is enough natural pectin to form a gel. There are three ways of determining this.

Cooking Test: Measure ⅓ cup of juice and ¼ cup of sugar into a small saucepan. Heat slowly, stirring constantly until all the sugar is dissolved. Bring the mixture to a boil and boil rapidly until it gives the sheeting test. Pour the jelly into a clean, hot jelly glass or a small bowl and let it cool. If the cooled mixture is jelly-like, your fruit juice will gel.

Alcohol Test: Add 1 teaspoon of juice to 1 table-spoon of rubbing alcohol. To mix, gently stir or shake the mixture in a closed container so that all the juice comes in contact with the alcohol. DO NOT TASTE — the mixture is poisonous. Fruit high in pectin will form a solid jelly-like mass that can be picked up with a fork. If the juice clumps into several small particles, there is not enough pectin for jelly.

Jelmeter Test: The jelmeter is a graduated glass tube that measures the rate at which fruit juices flow through the tube. It gives a rough estimate of the amount of pectin present in the juice and how much sugar should be used.

Testing Acid in the Juice

There is no home test to determine the amount of acid present. But you can do a simple taste test for tartness by mixing 1 teaspoon lemon juice, 3 table-spoons water and ½ teaspoon sugar. If your fruit juice does not taste as tart as this mixture, it is not tart enough. Add 1 tablespoon lemon juice or 1/8 teaspoon citric acid to each cup of fruit juice.

Doneness Test

The biggest problem in making jelly without added pectin is to know when it is done. It is particularly important to remove the mixture from the heat before it is overcooked, as there is little that can be done to improve an overcooked mixture. Signs of overcooking are a change in color of the mixture and a taste or odor of caramelized sugar. When cooking jelly remember that it should be boiled rapidly, not simmered.

Temperature Test: This is the most reliable of the doneness tests. First test the accuracy of the jelly or candy thermometer by placing it in boiling water to see if it measures 212 °F. Then place the thermometer in a vertical position into the boiling jelly mixture and read at eye level. The bulb of the thermometer must be completely covered with the jelly but must not touch the bottom of the saucepot. Use a jelly or candy thermometer and boil until mixture reaches 220 °F or 8 °F above the boiling point of water. Most areas in South Carolina would use 220 °F, but at altitudes between 1000 and 2000 feet, boil until the mixture reaches 218 °F.

Sheet or Spoon Test: Dip a cool metal spoon into the boiling jelly mixture. Raise the spoon about 12 inches above the pan (out of steam). Turn the spoon so the liquid runs off the side. When the mixture first starts to boil, the drops will be light and syrupy. As the syrup continues to boil, the drops will become heavier and will drop off the spoon two at a time. The jelly is done when the syrup forms two drops that flow together and sheet or hang off the edge of the spoon.

Refrigerator/Freezer Test: Pour a small amount of boiling jelly on a plate, and put it in the freezing compartment of a refrigerator for a few minutes. If the mixture gels, it should be done. During the test, the rest of the jelly mixture should be removed from the heat.

Jellies Made With Added Pectin

Jellies made from powdered or liquid pectin are prepared differently from those made without added pectin. Be sure to follow manufacturer's directions carefully. When commercial pectin is used, it is not necessary to test for pectin, acid or doneness. All-ripe fruit may be used for best flavor.

Jellied Products Without Added Sugar

Jellied products can be made without adding sugar or by adding less sugar than in a regular recipe. This cannot be done by leaving the sugar out of the regular jelly recipes. Four methods can be used as shown below. Follow the directions on the modified pectin box or in a no-sugar recipe exactly. Alterations in the recipe could result in product failures. These products do not have sugar as their preservative and must be processed or stored as directed. Some need longer processing in a boiling water bath and some need refrigeration.

Special Modified Pectins: This is a quick, easy way to make lower sugar jellied products that can be stored on the pantry shelf until opened. These pectins are not the same as regular pectin. Look for packages that say "light," "less sugar" or "no sugar needed" in the label. Specific recipes and directions are listed on the package insert. Follow these carefully for the brand of pectin you are using.

Regular Pectin With Special Recipes: These special recipes have been formulated so that no added sugar is needed. However, each package of regular pectin does contain some sugar. Artificial sweetener is often added.

Recipes Using Gelatin: Some recipes use unflavored gelatin as the thickener for the jelly or jam. Artificial sweetener is often added.

Long-Boil Methods: Boiling fruit pulp for extended periods of time will make a product thicken and resemble a jam, preserve or fruit butter. Artificial sweetener may be added.

Remaking Runny Jelly & Jam

Remake a trial batch using 1 cup of jelly or jam first. Measure jelly or jam to be remade. Don't remake more than 8 cups at one time.

To Remake Cooked Jelly Without Added Pectin: If the fruit juice was not acid enough, add 1½ teaspoons lemon juice per cup jelly before boiling. Heat the jelly to boiling and boil until the jellying point is reached. Remove jelly from heat, skim, pour immediately into sterilized hot containers and seal and process for 5 minutes.

To Remake Cooked Jelly or Jam With Powdered Pectin: For each cup of jelly or jam, measure 2 tablespoons sugar, 1 tablespoon water and 1½ teaspoons of powdered pectin. (Stir the package contents well before measuring.) Mix the pectin and water and bring to a boil, stirring constantly. Add jelly or jam and sugar. Stir thoroughly. Bring to a full rolling boil over high heat, stirring constantly. Boil hard ½ minute. Remove from heat, quickly skim foam off jelly and fill hot, sterile jars, leaving ¼-inch headspace. Adjust new lids and process in a boiling water bath for at least 5 minutes or for time specified in the recipe.

To Remake Cooked Jelly or Jam With Liquid Pectin: For each cup of jelly or jam, measure 3 tablespoons sugar, 1½ teaspoons lemon juice and 1½ teaspoons of liquid fruit pectin. Place jelly or jam in a saucepan and bring to a boil, stirring constantly. Quickly add the sugar, lemon juice and pectin. Bring to a full rolling boil, stirring constantly. Boil hard for 1 minute. Remove from heat. Quickly skim off foam

and fill hot, sterile jars, leaving ¼-inch headspace. Wipe jar rims. Adjust new lids and process in a boiling water bath for 5 minutes.

To Remake Uncooked Jelly or Jam With Liquid Pectin: In a bowl, mix jelly or jam and for each 1 cup of jelly or jam add 3 tablespoons sugar and 1½ teaspoons lemon juice. Stir well until sugar is dissolved (about 3 minutes). Add 1½ teaspoons liquid pectin per cup of jelly or jam and stir until well blended (about 3 minutes). Pour into clean containers. Cover with tight lids. Let stand in refrigerator until set. Then store in refrigerator or freezer.

To Remake Uncooked Jelly or Jam With Powdered Pectin: In a bowl, mix jelly or jam and 2 tablespoons sugar for each cup of jelly or jam. Stir well until dissolved (about 3 minutes). Measure 1 tablespoon water and 1 ½ teaspoons powdered pectin for each cup of jelly or jam. Place in small saucepan and place over low heat, stirring, until the powdered pectin is dissolved. Add to the sugar and fruit mixture and stir until thoroughly blended (about 2 to 3 minutes). Pour into clean containers. Cover with tight lids. Let stand in refrigerator until set. Then store in refrigerator or freezer.

Frequently Asked Questions

Why should cooked jelly be made in small batches? If a larger quantity of juice is used, longer boiling is needed causing loss of flavor, darkening of jelly, and toughening of jelly.

Should jelly be boiled slowly or rapidly? It should be boiled rapidly since long, slow boiling destroys the pectin in the fruit juice.

What do I do if there's mold on my jellied fruit product? If the mold is extensive, discard all of the product. If there is a slight amount of mold on the surface, discard the mold. Then remove ½-inch of the good product underneath and around it.

Why did my jellied fruit product ferment, and what do I do? Jellied fruit products may ferment because of yeast growth. This can occur if the product is improperly processed and sealed, or if the sugar content is too low. Fermented fruit products have a disagreeable taste. Discard them.

Table 1. Instructions & Proportions for Extracting Juice from Specific Fruits

Fruit	Cups of Water to be Added Per Pound of Fruit	Minutes to Simmer Fruit before Extracting Juice	Ingredients Added to Each Cup of Strained Juice		Yield from 4 Cups of Juice (Half-Pints)
			Sugar (Cups)	Lemon Juice (Tsp.)	
Apples	1	20-25	¾	1½ (opt)	4-5
Blackberries	None or ¼	5-10	¾-1	None	7-8
Crab Apples	1	20-25	1	None	4-5
Grapes	None or ¼	5-10	¾-1	None	8-9
Plums	½	15-20	¾	None	8-9

For more information on making jellies & jams, see **HGIC 3200, *Jelly & Jam Recipes***. For information on using a water bath canner, see **HGIC 3040, *Canning Foods at Home***.

If this document didn't answer your questions, please contact HGIC at **hgic@clemson.edu** or 1-888-656-9988.

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