

THE SCIENCE OF JAM AND JELLY MAKING



Home canning jams and jellies is fun and satisfying. Generally referred to as soft spreads, they differ only in their consistency. They all are made of four main ingredients: fruit, sugar, pectin, and acid. The formation of a gel depends on the right amount of each of these ingredients. If you understand the science of jelling, all your soft spreads will be a success.

Soft Spreads

Butters are made by cooking fruit pulp and sugar to a thick consistency that will spread easily. Spices may be added, depending on personal taste.

Conserves are jam-like and made by cooking two or more fruits with sugar until the mixture will either round up on a spoon like jam or flake from it like jelly. A true conserve contains nuts and raisins.

Jams are made by cooking crushed or chopped fruits with sugar until the mixture will round up on a spoon. Jams do not hold their shape but are spreadable.

Jellies are made from the strained juice of fruit. Jelly should be crystal clear and shimmering. It should hold its shape but be soft enough to spread.

Marmalades are soft-fruit jellies containing small pieces of fruit or peel evenly suspended in the transparent jelly.

Preserves are fruits preserved with sugar so that the fruit retains its shape. Preserves are clear, shiny, tender, and plump.

Pectin and Fruit

Pectin is a carbohydrate found in fruits. When sugar is added, the pectin in fruit or commercial pectin precipitates out and forms insoluble fibers. An acid, such as lemon juice or citric acid, aids in the process. The insoluble fibers produce a mesh-like structure that traps the fruit juice or other liquid, much like a sponge absorbs water. This enables a gel to form.

Recipes without added pectin use the natural pectin in the fruit to form the gel. Tart apples, sour blackberries, cranberries, currants, gooseberries, Concord grapes, soft plums, and quinces work well in recipes without added pectin.

Slightly under-ripe fruit contains more pectin than ripe fruit. Overripe fruit may not contain enough pectin to form a gel. A general guideline is to use one part under-ripe fruit to two parts fully ripe fruit for the best gel and flavor. The USDA canning guide recommends at least one-fourth of the fruit to be under-ripe.

Other fruits, such as apricots, blueberries, cherries, peaches, pineapple, rhubarb, and strawberries are low in pectin. To form a gel, they must be combined with one of the higher pectin fruits or used with a commercial pectin product. Use of the commercial pectin decreases cooking time.

The pectin in fruit becomes water soluble when it is heated. So for jelling to occur, the fruit must be heated. Too high of a temperature or cooking for too long can destroy the pectin, resulting in a poor gel. Doubling the recipe changes the length of time needed for boiling and can result in a soft gel.

Commercial pectin can be used with any fruit, even those high in pectin. Too much pectin will give the jelly a tough, rubbery consistency, making it difficult to spread. Following the recipe guide that comes with the pectin will help eliminate this problem.

There are two types of pectin, liquid (usually made from apples) and dry (from citrus fruits or apples). Powdered pectin can be stored in the freezer from one season to the next. Freezing will destroy the gel-producing qualities of liquid pectin, but liquid pectin will keep for two years in a cool, dry place. Powdered and liquid pectin are not interchangeable. The production code on the back will indicate the date of packaging. If the first number is a 4 for example, it was packed in 2004.

There are several products on the market that allow you to make jams and jellies that are lower in calories. These low methoxyl pectin products allow you to make jams and jellies with less sugar but they will not be quite as thick or glossy.

Acid

The acidity level is also important to jelling. The gel will not set if there is too little acid. Too much acid will cause the gel to lose liquid or weep. For fruits low in acid, add lemon juice or other acid source as instructed.

Sugar

Sugar is necessary for the gel to form. It also acts as a preserving agent and contributes flavor. Do not attempt to reduce the amount of sugar in regular jam and jelly recipes as a syrupy gel will form. When using low methoxyl pectin products, you must use the recipes provided in the package.

Remaking Jams or Jellies

If jam or jelly does not set up after cooling, it can be remade. There are different directions depending on the type of commercial pectin that you use.

Possible reasons that a jam or jelly may be too soft include overripe fruit, fruit lacking the proper acidity, excess or not enough sugar, trying to increase the recipe, not using a full rolling boil, use of old pectin, or a mistake in measurement.



Step-By-Step Canning

1. Assemble all equipment utensils.
2. Visually examine jars, lids, and bands for defects. Wash jars and two-piece caps in hot, soapy water. Sterilize jars by placing in boiling water for 10 minutes. Place lids, bands, and jars in simmering water. Remove pan from heat and allow the lids and jars to remain in the hot water until needed. Do not boil the lids. Dry the bands and set aside.
3. Use top-quality fruits after washing.
4. Prepare only one recipe at a time and follow the directions.
5. Remove from heat and skim foam.
6. Immediately fill hot spread into hot jars, leaving a ½-inch headspace.
7. Wipe top of jars and adjust caps.
8. When all the jars are full, place on a rack. Lower in a canner half full of boiling water. Add boiling water to cover two-piece caps by 1 to 2 inches.
9. When processing time is complete, remove jars from canner. Most recipes call for at least five minutes. Stand jars upright on a towel a few inches apart.
10. After 12 to 24 hours, test seals and remove bands.
11. Wash outside of jar and lid surface. Label and store sealed jars in a cool, dark, dry place.
12. Enjoy your very own spreads.

References

- Ball Blue Book® of Preserving*, Altrista Consumer Products Company, 2003.
- McGee, H. *On Food & Cooking*, Scribner, 1997.
- USDA Guide to Home Canning & Preserving*, Second Edition, 1999.

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