



For Safety's Sake . . .

Making Pickles in North Carolina

Pickling is a way to preserve food by using salt, vinegar, and/or sugar. There are many types of pickles. Each calls for a different combination of ingredients and preparation methods.

No matter which type you make, you must maintain the acidity of the pickling brine below 4.6 if you use water bath canning. You can do this only by using vinegar that is at least 5 percent acetic (or 50 grains).

TYPES OF PICKLES

Fermented pickles are vegetables soaked in a brine solution for 4 to 6 weeks. During this time, lactic acid bacteria, naturally present on the surface of vegetables, grows. Other microbes are inhibited by salt. The color of the vegetables changes from bright green to olive/yellow-green, and the white interior becomes translucent. Examples include dill pickles and sauerkraut.

Refrigerated dills are cucumbers fermented for 1 week in a salt brine and then stored in the refrigerator for up to 2 months.

Fresh-pack (or quick process) pickles are cured for several hours in a vinegar solution or are immediately combined with hot vinegar, spices, and seasonings. Examples include bread-and-butter pickles and pickled beets.

Fruit pickles are whole or sliced fruit simmered in a spicy, sweet-sour syrup. Examples include spiced peaches and crabapples.

Relishes are made from chopped fruits or vegetables that are cooked to a desired consistency in a spicy vinegar solution. Examples include corn relish and horseradish.

INGREDIENTS

Vegetables or fruits for pickling

- Choose fruits and vegetables that are firm but ripe and in good condition with no evidence of disease or insect damage.
- Remove the blossom end of the cucumbers. The blossom contains enzymes that cause softening of the final pickle product.
- Use unwaxed cucumbers for pickling so brine will penetrate.
- Discard any cucumbers that “float.” Gas is produced inside these cucumbers, making them hollow. These cucumbers can be used for relish.
- Prepare fruits and vegetables for pickling within 24 hours of harvest.

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- Pickle yields:
 - Use 14 pounds of cucumbers for a 7-quart canner load.
 - Use 9 pounds of cucumbers for a 9-pint canner load.
 - One bushel weighs 48 pounds and yields 16 to 24 quarts (2 pounds per quart).
 - Use cucumbers that are 1 1/2 inches long to make gherkins and 4 inches long to make dills.

Vinegar

Vinegar must be at least 5 percent acetic so that low-acid vegetables such as cucumbers are properly acidified. *Never* dilute the amount of vinegar stated in a recipe. For every cup of water, add 1 cup of vinegar. The acid must be uniform throughout the vegetable to prevent the growth of botulinum bacteria.

Use white vinegar to pickle light-colored fruits and vegetables. *Never use homemade vinegar*—there is no way to know its true acidity.

Salt

Use canning or pickling salt because they contain no iodine. Iodine can cause darkening of the pickles because it contains anti-caking ingredients such as sodium silicate or tricalcium phosphate, (which also causes cloudy brine).

In fermented pickles, salt inhibits the growth of undesirable microorganisms. Salt also draws water out of the vegetable, making the pickle more firm. Too much salt causes shriveling. Never reduce the amount of salt in a fermented pickle recipe.

Never use “sour salt.” Sour salt is citric acid and does not inhibit the growth of microorganisms that cause fermented pickles to spoil.

If you use reduced-sodium salt, use it only for fresh-pack pickles—never for fermented pickles. Fresh-pack pickles are acidified with vinegar, so they can be prepared with less or no salt. However, their flavor and texture might be affected.

Sugar

Use either white or brown granulated sugar. Brown sugar turns light-colored vegetables dark. Make your choice based on your color or flavor preference.

Spices

Use fresh, whole spices packed in a cheesecloth bag. Powdered spices cause darkening and cloudy brine.

Water

Hard water often interferes with acid formation in fermented pickles. Also, hard water with a pH of 8.0

or higher can affect the acidity of the curing brine.

To soften hard water, boil it for 15 minutes, then let it stand for 24 hours. Skim off any scum that appears. Pour the water out of the container so sediment is not disturbed.

Firming Agents

Alum can be safely used to firm fermented pickles, but it is not necessary. Alum does not improve the firmness of fresh-pack pickles—the calcium in the lime does that. To improve the crispness, soak cucumbers in a solution of 1 tablespoon lime per quart of water for 12 to 24 hours before fermentation. Excess lime absorbed by the cucumbers must be removed to make safe pickles. To remove excess lime, drain the lime-water solution, rinse the cucumbers, and then resoak them in fresh water for 1 hour. Repeat the rinsing and soaking steps two more times.

PREVENTING SPOILAGE

Pickle products are subject to spoilage from yeasts and molds and from enzymes that might affect flavor, color, and texture. Processing pickles in a water bath canner will prevent this. Always use standard canning jars; two-piece canning lids are recommended. Processing times and procedures vary depending on the food being pickled.

EQUIPMENT FOR SUCCESSFUL PICKLING

Using the right type of equipment saves time and energy. Read the entire recipe before beginning to prepare pickles. Have all the utensils and tools you need ready to use.

Utensils

Heat pickling solutions in containers of unchipped enamelware, stainless steel, aluminum, or glass. Never use copper, brass, galvanized, or iron utensils; the metals might react with acids or salts and cause undesirable color changes in the pickles or form undesirable compounds.

When making fermented pickles, use an unglazed crock or stone jar, an unchipped enamel-lined pan, or a large glass jar, bowl, or casserole. Use a heavy plate or large glass lid that fits inside the container to cover vegetables in the brine. Use a weight to hold the cover down and keep vegetables below the surface of the brine. A glass jar filled with brine makes a good weight. A food-grade, heavyweight plastic bag filled with brine is another effective weight. Fill the bag with enough brine to form a tight-fitting cover over the vegetables. Tie it tightly so the brine will not leak out.

For added protection, put the brine-filled bag inside another heavyweight plastic bag intended for food use. Check the bags daily for leaks. If a small amount of the brine leaks out, it will not hurt the fermenting vegetables. But still replace the bag because there is a greater chance of leaking the longer the solution stays in the bag.

Do not cover fermenting cucumbers with a plastic bag. Cucumbers sometimes become hollow during fermentation due to a buildup of carbon dioxide inside the cucumber. The brine surface should not be tightly sealed so the carbon dioxide can escape.

Small utensils that make preparation easier include:

measuring spoons	ladle with lip
sharp knives	slotted spoon
large trays	footed colander
tongs	wire basket
vegetable peelers	funnel
food chopper/grinder	cutting board

Scales

The use of scales to weigh ingredients, especially when fermenting, is important. They are essential in making sure the proportions of vegetables by weight to salt is accurate for successful fermentation. Good household scales are readily available and not expensive.

Water bath canner

Inexpensive water bath canners are available at many hardware and variety stores. However, any large metal container can be used if it:

- Is deep enough to allow for 1 to 2 inches of water above the tops of the jars, plus a little extra space for boiling.
- Has a close-fitting cover.
- Has a rack with partitions to keep jars from touching each other and hitting the sides of the canner.
- A steam-pressure canner can serve as a water bath. To use it for this purpose, set the cover in place without fastening it. Be sure the petcock is wide open so that steam escapes and pressure does not build up.

Glass jars and lids

Use jars designed for home canning. Other jars break more easily or do not seal properly.

Use jars that are free of cracks, chips, or any other defect. Run your finger carefully along the rims of the jars to check for these defects. Lids must be free of rust and dents. Always use new flat, rubber-lined metal

lids. Faulty jars and lids result in faulty seals, which might allow the product to spoil faster or become unsafe.

Before packing products into jars, wash jars in hot, soapy water or in your dishwasher.

PROCEDURES FOR PICKLING

To ensure acceptable quality and safety of the pickle product, follow these procedures:

Packing jars

Uniformly pack pickle products into jars before processing. Do not pack tightly. Leave enough room for the brine or syrup to surround the product. Leave 1/2-inch headspace (headspace is the space between the top of the product inside the jar and the bottom of the lid).

Wipe the rim and threads of the jar with a clean cloth. Small food particles on the rim could result in a faulty seal.

Closing jars

Use the two-piece canning lid (flat metal lid and screw band) to seal the jar. Put the lids in boiling water for a few seconds before use. Put the lid on the jar with the sealing compound (the rubber-like substance on the lid that secures the seal) next to the glass. Screw on the metal band. When the band is screwed hand tight, the lid has enough “give” to let air escape during processing. Do not tighten the screw band further after processing.

If liquid has boiled out of a jar during processing, do not open it to add more liquid because spoilage organisms might contaminate the product. Loss of liquid does not cause food to spoil; however, the vegetables at the top of the jar might darken or dry out.

Heat treatment

Pickle products must undergo heat treatment to destroy spoilage organisms and to inactivate enzymes that affect flavor, color, and texture of the product during storage. Process in a water bath canner for the time outlined in timetable. Open-kettle canning is *not* recommended.

Immerse the jars in actively boiling water in a canner. Water must cover the jars at least 1 to 2 inches. Return the water to boiling as quickly as possible. Begin counting processing time when the water returns to a boil, and continue to boil gently for the time recommended.

Processing procedures for fermented cucumbers and fresh-pack pickles are slightly different from

normal water bath procedures. For these products, start to count the processing time as soon as the filled jars are placed in the actively boiling water. This prevents development of a cooked flavor and loss of crispness.

Processing times given in the recipes that follow are for altitudes less than 1,000 feet above sea level. At altitudes of 1,000 feet or above, increase processing times by 1 minute for each 1,000 feet above sea level.

Cooling the canned pickles

To cool the jars, put them upright on a wire rack or folded towel, leaving several inches between jars to allow free circulation of air. Keep the jars out of drafts. Do not cover them.

Cool for 12 to 24 hours. Remove metal screw bands and check jars for a seal. If the center of the lid has a slight dip or stays down after processing, the jar is sealed. Refrigerate jars that did not seal, or reprocess them. Reprocessing results in a soft product.

Storing the canned pickles

Remove the metal screw bands from the two-piece lids so they will not rust. You can loosen sticking bands by covering them with a hot, damp cloth for a short time. Wash the bands and dry them thoroughly for reuse. Wipe jars with a clean, damp cloth and label them with the name of the product and date. Store in a dark, dry, cool place where there is no danger of freezing.

Before opening a jar, examine it carefully. A bulging lid or leakage means the contents are spoiled. When a jar is opened, look for signs of spoilage, such as:

- Spurting liquid
- Mold
- Disagreeable odor
- Change in color, or
- An unusual softness, mushiness, or slipperiness of the pickle product.

If there is even the *slightest* indication of spoilage, do not eat—or even taste—the product. Dispose of the contents so they cannot be eaten by people or animals.

Pickle Recipes

Quick Fresh-Pack Dill Pickles

8 lb of 3- to 5-inch pickling cucumbers
2 gallons water
1 1/4 to 1 1/2 cups canning or pickling salt
1 1/2 qt vinegar (5 percent acidity)
1/4 cup sugar
2 to 2 1/4 qt water
2 Tbsp whole mixed pickling spice
3 to 5 Tbsp whole mustard seed
(1 to 2 tsp per pint jar)
About 14 to 21 heads of fresh dill
(1 1/2 to 3 heads per pint jar)
or
4 1/2 to 7 Tbsp dill seed (1 1/2 tsp to
1 Tbsp per pint jar)

Yield: 7 to 9 pints

Procedure: Wash cucumbers. Cut 1/16-inch slice off blossom end and discard, but leave 1/4-inch of stem attached. Dissolve 3/4 cup salt in 2 gallons water. Pour over cucumbers and let stand 12 hours. Drain. Combine vinegar, 1/2 cup salt, sugar, and 2 quarts water. Add mixed pickling spices tied in a clean white cloth. Heat to boiling. Fill jars with cucumbers. Add 1 tsp mustard seed and 1 1/2 heads fresh dill per pint. Cover with boiling pickling solution, leaving 1/2-inch headspace. Adjust lids. Process pints for 10 minutes and quarts for 15 minutes in a boiling water canner.

Bread-and-Butter Pickles

6 lb of 4- to 5-inch pickling cucumbers
8 cups thinly sliced onions (about 3 pounds)
1/2 cup canning or pickling salt
4 cups vinegar (5 percent acidity)
4 1/2 cups sugar
2 Tbsp mustard seed
1 1/2 Tbsp celery seed
1 Tbsp ground tumeric

Yield: About 8 pints

Procedure: Wash cucumbers. Cut 1/16-inch off blossom end and discard. Cut into 3/16-inch slices. Combine cucumbers and onions in a large bowl. Add salt. Cover with 2 inches crushed or cubed ice. Refrigerate 3 to 4 hours, adding more ice as needed.

Combine remaining ingredients in a large pot. Boil 10 minutes. Drain and add cucumbers and onions, slowly reheating to boiling. Fill jars with slices and

cooking syrup, leaving 1/2-inch headspace. Adjust lids. Process pints or quarts for 10 minutes in a boiling water canner.

Storage: After processing and cooling jars, store them 4 to 5 weeks to develop ideal flavor.

Variation: Squash bread-and-butter pickles. Substitute slender (1 to 1 1/2 inches in diameter) zucchini or yellow summer squash for cucumbers.

Quick Sweet Pickles

8 lb of 3- to 4-inch pickling cucumbers
(may be canned as strips or slices)
1/3 cup canning or pickling salt
4 1/2 cups sugar
3 1/2 cups vinegar (5 percent)
2 tsp celery seed
1 Tbsp whole allspice
2 Tbsp mustard seed

Yield: About 7 to 9 pints

Procedure: Wash cucumbers. Cut 1/16-inch off blossom end and discard, but leave 1/4 inch of stem attached. Slice or cut into strips if desired. Place in bowl and sprinkle with 1/3 cup salt. Cover with 2 inches of crushed or cubed ice. Refrigerate 3 to 4 hours. Add more ice as needed. Drain well.

Combine sugar, vinegar, celery seed, allspice, and mustard seed in a 6-quart kettle. Heat to boiling.

Hot Pack—Add cucumbers to vinegar solution and heat slowly until it returns to boil. Stir occasionally to make sure mixture heats evenly. Fill sterile jars, leaving 1/2-inch headspace. Adjust lids. Process for 5 minutes in a boiling water canner.

Raw Pack—Fill jars, leaving 1/2-inch headspace. Add hot pickling syrup, leaving 1/2-inch headspace. Adjust lids. Process pints for 10 minutes and quarts for 15 minutes in a boiling water canner.

Storage: After processing and cooling jars, store them 4 to 5 weeks to develop ideal flavor.

Variation: Add 2 slices of raw onion to each jar before filling with cucumbers.

Sauerkraut

25 lb of cabbage
3/4 cup canning or pickling salt

Quality: For the best sauerkraut, use firm heads of fresh cabbage. Shred cabbage and start kraut between 24 and 48 hours after harvest.

Yield: About 9 quarts

Procedure: Work with about 5 pounds of cabbage at a time. Discard outer leaves. Rinse heads under cold running water and drain. Cut heads into quarters and

remove cores. Shred or slice to the thickness of 1/4 or 1/8 inch. Put cabbage in a suitable fermentation container, and add 3 tablespoons of salt. Mix thoroughly, using clean hands. Pack firmly until salt draws juices from cabbage. Repeat shredding, salting, and packing until all cabbage is in the container. Be sure it is deep enough so that the rim is at least 4 or 5 inches above the cabbage. If juice does not cover cabbage, add boiled and cooled brine (1 1/2 tablespoons of salt per quart of water). Add plate and weights; cover container with a clean bath towel. Store at 70° to 75° F while fermenting. Kraut will be fully fermented in 3 to 4 weeks. At 60° to 65° F, fermentation may take 5 to 6 weeks. Kraut may not ferment at temperatures lower than 60° F and may become soft above 75° F.

If you weigh the cabbage down with a brine-filled bag, do not disturb the crock until normal fermentation is completed (when bubbling ceases). If you use jars as a weight, check the kraut 2 to 3 times each week and remove scum if it forms. Fully fermented kraut may be kept tightly covered in the refrigerator for several months or it may be canned as follows:

Hot Pack—Bring kraut and liquid slowly to a boil in a large kettle, stirring frequently. Remove from heat and fill jars rather firmly with kraut and juices, leaving 1/2-inch headspace. Screw on lids and adjust. Process pints for 10 minutes and quarts for 15 minutes in a boiling water canner.

Raw Pack—Fill jars firmly with kraut and cover with juices, leaving 1/2-inch headspace. Screw on lids and adjust. Process pints for 20 minutes and quarts for 25 minutes in a boiling water canner.

Hungarian, Banana, Chile, Jalapeno Pickles

4 lb hot, long, red, green, or yellow peppers
3 lb sweet red and green peppers, mixed
5 cups vinegar (5 percent)

1 cup water for pickling solution
4 tsp canning or pickling salt
2 Tbsp sugar
2 cloves garlic

Yield: About 9 pints

Caution: Wear rubber gloves when handling hot peppers or wash hands thoroughly with soap and water before touching your face. Pepper oils will cause your skin and eyes to burn.

Procedure: Wash peppers. If small peppers are left whole, slash 2 to 4 slits in each. Quarter large peppers. Blanch in boiling water or blister in order to peel. Peppers may be blistered using one of the following methods:

Oven or broiler method—Place peppers in a hot oven (400° F) or broiler for 6 to 8 minutes or until skins blister.

Range-top method—Cover hot burner, either gas or electric, with heavy wire mesh. Place peppers on burner for several minutes until skins blister. Cool and peel off skin. Flatten small peppers. Fill jars, leaving 1/2-inch headspace. Combine and heat other ingredients to boiling, then simmer for 10 minutes. Remove garlic. Pour hot pickling solution over peppers, leaving 1/2-inch headspace.

Adjust lids. Process half-pints or pints for 10 minutes in a boiling water canner.

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For more information on food safety, visit N.C. Cooperative Extension's Food Safety Website at <http://www.ces.ncsu.edu/depts/foodsci/agentinfo/>. You also may view publications from the departments of Family and Consumer Sciences and Food Science at <http://www.ces.ncsu.edu/depts/fcs/general/resource.html> and <http://www.ces.ncsu.edu/depts/foodsci/ext/pubs/>

Prepared by

Judy Henderson and Carrie Thompson, Extension Agents, Family and Consumer Education

Members of the Food Safety Agent Resource Team

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