Canning Fruits and Vegetables

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Canning can be a safe and economical way to preserve quality food at home. Home-preserved foods can help provide a variety of nutritious meals for your family all year long.

How Canning Preserves Foods

The high water content of most fresh foods makes them very perishable. Foods spoil or lose their quality for several reasons:

- growth of undesirable micro-organisms—bacteria, molds and yeasts
- activity of food enzymes
- reactions with oxygen
- moisture loss

Micro-organisms live and multiply quickly on the surfaces of fresh food and on the inside of bruised, insect-damaged and diseased food. Oxygen and enzymes are present throughout fresh food tissues.

Proper canning practices remove oxygen, destroy enzymes, prevent the growth of undesirable bacteria, yeasts, molds and help form a high vacuum in jars. Good vacuums form tight seals which keep liquid in and air and micro-organisms out.

Ensuring Safely-Canned Foods

Growth of the bacterium *Clostridium botulinum* in home canned food may cause botulism—a deadly form of food poisoning. These bacteria exist either as spores or as vegetative cells. The spores, which are comparable to plant seeds, can survive in the soil and water for many years. When ideal conditions exist for growth, the spores produce vegetative cells

Photo courtesy of National Presto Industries, Inc.

which multiply rapidly and may produce a deadly toxin within three to four days in an environment consisting of:

- a moist, low-acid food;
- a temperature between 40 degrees F and 120 degrees F; or
- less than 2 percent oxygen.

Botulinum spores are on most fresh food surfaces. Because they grow only in the absence of air, they are harmless on fresh foods.

Most bacteria, yeasts and molds are difficult to remove from food surfaces. Washing fresh food reduces their numbers only slightly. Peeling root crops, underground stem crops and tomatoes greatly reduces their numbers. Blanching also helps, but it's vital to make sure recommended processing procedures and times are used.

Processing Methods

Whether food should be processed in a pressure canner or boiling-water canner to control botulinum bacteria depends on the acidity in the food. Acidity of foods is measured by pH.

Low-acid foods contain too little acidity to prevent the growth of botulinum bacteria. Low-acid foods have pH values higher than 4.6. They include red meats, seafood, poultry, milk and all fresh vegetables except most tomatoes. Most food mixtures have pH values above 4.6 unless the recipes include enough lemon juice, citric acid or vinegar to make them acid foods.

Botulinum spores are very hard to destroy at boiling-water temperatures. Therefore, process all low-acid foods using 10–15 pounds of pressure to attain temperatures of 240 degrees F to 250 degrees F. To assure micro-organisms in low-acid foods are destroyed, use the correct time and pressure specified for your altitude.

Acid foods contain enough acidity to inhibit botulinum spores and vegetative cell growth or destroy them more rapidly when heated. The pH value of acid foods is 4.6 or lower. Acid foods include fruits, pickles, sauerkraut, jams, jellies, marmalades and fruit butters. Tomatoes are usually considered an acid food, although some varieties are known to have pH values slightly above 4.6. If tomatoes are to be canned as acid foods, these products must be acidified to a pH of 4.6 or lower with vinegar, lemon juice or citric acid. To destroy micro-organisms in acid foods processed in a boiling water canner, you must process jars for the correct number of minutes.

FOR MORE INFORMATION

The following University of Nebraska-Lincoln publications are available at the extension office and online at http://www.ianrpubs.unl.edu/sendIt/foods/:

- **Let's Preserve: Canning Basics (EC434)**
- **Let's Preserve: Vegetable and Vegetable Products (EC435)**
- **Let's Preserve: Fruit and Fruit Products (EC436)**

Landscape Water

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before applying irrigation. This actually causes the grass plant to explore deeper soil depths for moisture and nutrients. It is best not to irrigate based on a schedule. Irrigate based on plant need. When properly managed, turfgrass is more tolerant of drought conditions than you think.

Cultural practices like aeration, mowing and fertilization can affect the root depth. Aerify to improve water and air entry into the soil. Raise the mowing height to the upper limits of your mower to encourage deep rooting during periods of heat stress. During periods of moisture stress limit nitrogen fertilizer application.

To avoid runoff, apply water gently and slowly at a rate the soil can absorb. Use a soaker hose or drip irrigation to water trees, shrubs and flowers. When using sprinklers, make sure the water reaches your lawn and plants, not the sidewalk, driveway or street. When you notice water runoff stop irrigating.

Even when water is in ample supply, reducing water use is a good idea. It lessens the demand on rural and municipal water supplies and treatment plants. It can greatly decrease your maintenance time and equipment costs.

Heating With Wood

Scott DeWald, *UNL District Extension Forester;*
Scott Josiah, *Nebraska Forest Service Director;*
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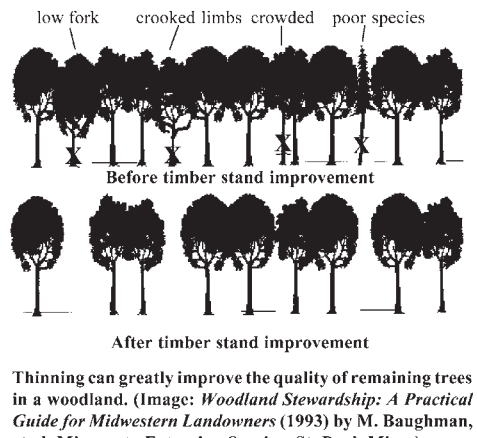
Our forefathers heated their homes with wood because it was the only energy source available. Today, most people heat their home with electricity or natural gas, but wood heat remains a viable home heating alternative.

Heating with wood provides several advantages over other sources of energy. Wood heat does not stop working when there is a blackout. With electric heat, you may find yourself in the cold when severe winter weather interrupts electrical service.

Heating with wood is also environmentally friendly. Burning wood produces little pollution, especially with modern high-efficiency stoves. Additionally, ashes from your fireplace or wood stove may be used in your garden to prevent pests and enrich the soil.



Thinning can greatly improve the quality of remaining trees in a woodland. (Image: *Woodland Stewardship: A Practical Guide for Midwestern Landowners* (1993) by M. Baughman, et al. Minnesota Extension Service, St. Paul, Minn.)

Wood is a renewable resource, as compared to finite fossil fuels, such as coal or gas. Fuelwood can be harvested from low-quality trees in woodlands, providing more space for the remaining healthier, higher quality trees.

Species Characteristics

Each species of wood differs widely in its characteristics. For example, a cord of white oak firewood produces 29 million BTUs of heat, while one cord of linden firewood produces 13.8 million BTUs. High-density hardwoods, such as hickory, oak, ash, red elm and walnut, produce the most heat per cord and burn slowly and cleanly. In general, if heating efficiency is important, high-density woods, particularly hardwood species, are more desirable. Softwoods, such as most spruces, pines and junipers and low-density hardwoods, such as cottonwood and willow, burn quickly and produce less heat per cord than dense hardwoods.

Because of resins in softwoods, they tend to smoke and spark and may present safety hazards. Softwoods also produce more creosote, a sticky tarlike substance that clings to chimneys and increases the risk of chimney fires.

FOR MORE INFORMATION

University of Nebraska-Lincoln NebGuide G1554, "Heating With Wood: Producing, Harvesting and Processing Firewood," available at the extension office and online at http://www.ianrpubs.unl.edu/epublic/live/g1554/build/g1554.pdf

Commercial Nitrogen

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urea fertilizer broadcast to the soil surface with no mechanical incorporation can have volatilization losses exceeding 75%. On the other hand, surface-applied urea followed by sufficient rainfall or irrigation to hydrolyze the urea and to incorporate the resulting ammonium into the soil (one-half inch is usually sufficient) will suffer very little volatilization loss.

Phosphorus / Nitrogen Sources

Some fertilizers applied primarily as sources of phosphorus also contain significant levels of nitrogen. Diammonium phosphate (DAP) contains 18% N and 46% P_2O_5 by weight (18-46-0). Monoammonium phospahte (MAP) is usually formulated as 11-52-0. Other common phosphorus sources that contain nitrogen include 10-34-0 and 11-37-0. If any of these compounds are applied as a source of phosphorus, one should credit the nitrogen contained in these compounds when computing total nitrogen fertilizer to apply.

Fall Prairie Seeding Site Preparation

Steve Lekwa
Story County, Iowa Conservation Director

Fall is a wonderful time to plant a new prairie. It's less hurried since seeding can occur right up to freezing. Forbs, flowering prairie plants, do particularly well when seeded in the fall after soil temperatures are cool enough to prevent germination, usually after mid October. Site preparation needs to begin in late summer in order to be ready in time.

The goal in any prairie seeding is to start with a firm, weed-free seedbed. Soybean stubble is a nearly perfect seedbed with little additional work. A light disking or dragging may be desirable if the rows are too rough. Corn stubble is more difficult to prepare and has a higher probability of damaging chemical carry over. Conversion of turf grass to prairie requires suppression of the perennial cool-season turf prior to seeding prairie. This can be accomplished with a chemical like Roundup® applied at labeled rates, and/or by conventional tillage. Direct seeding into dead sod is possible if a no-till planter is available. If not, the sod must be broken up sufficiently to form the desired firm seed bed. It will likely take multiple passes with conventional farm equipment (plow, disk, drag), but a large rototiller can break it up faster. Rototilled soil tends to be too fluffy for good prairie seeding, so a firming pass or two with a roller may be needed before and after seeding.