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Agricultural Extension Service
The University of Tennessee
SP307-O

Fruits and Nuts

Home Apple Cider Production

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Cider making is an art that is as old as apple production itself. When properly made, fresh apple cider is a safe, natural, delicious product that conjures up images of autumn and the country.

Apple cider is simply the liquid that is released when apples are crushed. It has nothing added and nothing taken away from it. Apple cider will be cloudy due to the presence of suspended apple solids. Since apple cider contains no preservatives, it has a limited shelf life, and special attention must be paid to proper storage. The terms apple cider and apple juice are often used interchangeably.

Apple cider production is a food processing operation. Commercial operations are subject to the same regulations, including good manufacturing practices, as are other types of food processing operations. This factsheet focuses on noncommercial apple cider production. While the basic concepts and most processing practices are the same, commercial producers should work closely with regulatory agencies in setting up and operating their facilities.

Selecting Apples for Use in Cider

Quality apple cider production requires that strict attention be paid to all facets of the operation. The first part of the process occurs in the orchard with the selection of apples. Good-quality apple cider cannot be made from poor-quality fruit or fruit that is handled carelessly. Use the following guidelines when selecting apples:

1) Choose firm-ripe fruit. The amount and quality of the cider obtained from immature or over-mature apples will be lower than that from apples selected at the firm-ripe stage.
2) Always select clean fruit.
3) Apples should be sound. Defects such as rots or insect damage will lower cider quality. Apples having these problems should be discarded.
4) To make high-quality, safe apple cider, there are several good reasons not to use apples that have laid on the ground:
   a) Fruit that has been on the ground for several days will develop an off taste that will be noticeable in the cider.
   b) Several harmful bacteria may be present in apples that are picked up off the ground and not sanitized before the crush process. Food-borne illnesses have been attributed to fresh cider contaminants such as *E. coli O157:H7*, Salmonella and Cryptosporidiosis. These bacteria can cause serious illness and even death in the very young, the elderly, those who are pregnant or individuals with a compromised immune system.
   c) A potentially serious toxicant called Patulin, which is produced by certain molds, may become an increased threat.
5) Apples that are not satisfactory for fresh fruit use due to lack of adequate size, undesirable shape or minor blemishes are fine for use in cider if their quality is adequate.

Blending Apple Varieties

The best cider results from blending together several apple varieties. Different varieties contribute different tastes to the final product. Varieties are categorized into three or four groups depending on the characteristics they impart to the cider. A given variety may appear in more than one group. These groups are:

1. Sweet subacid. This group includes apples that are grown primarily for eating fresh. It usually makes up the highest percentage of apples used in a blend. Examples of varieties in this group include Red Delicious, Rome, Grimes Golden, Cortland, Fuji, Jonagold and Empire.
2. Aromatic. Apples in this group are characterized by outstanding aromas, flavors and fragrances that are carried over into the cider. Examples include Red Delicious, Golden Delicious, McIntosh and Gala.
3. Mildly acid to slightly tart. Apples in this group add tartness or tang to the cider. Varieties include Winesap (including Stayman), Jonathan and Granny Smith.
4. Astringent. This group provides the tannins for special taste. Crab apples are the primary ones found in this group. Varieties from this group are not always used in the cider.

Romes tend to be somewhat neutral in flavor. Fairly large amounts of this variety may be used to add volume to the cider, as it will not overpower characteristics of other varieties.

Blends chosen reflect the taste preferences of the cidermaker and the consumer. As a general rule, people in the southern U.S. prefer a sweeter cider than those in the northern areas. Therefore, adjustments in the blend can be made to provide consumers with cider they prefer.

Blends will change at different times throughout the season. Changes reflect differences in the availability of varieties with the passage of time. If possible, certain varieties should be stored to insure their availability for use in blending as the season progresses.

Differences will also exist in the blend from year to year. Factors such as crop load, weather and tree health may affect taste characteristics of a given variety.

Making the Cider

Once the apples have been selected, attention needs to be focused on the process of actually making the cider. Several steps need to be discussed:

1. *Temperature.* Apples to be used for cider should be held under refrigeration at temperatures close to 32 degrees F up to the time they are processed. This will help to maintain fruit firmness and quality, as well as retard the onset of decay and the increase in bacterial populations, if present. In addition, apples crush better when cold.
2. *Grading*. Inspect the apples immediately prior to use. Discard any unsound fruit. Poor-quality apples may cause an undesirable change in the color of the cider, as well as in its taste, keeping qualities and safety. Good-quality cider cannot be made from poor-quality apples.
3. *Washing*. Wash all apples with fresh water that is at least 10 degrees **warmer** than the fruit being processed to prevent infusion of contaminates into the flesh of the apples. Add a weak chlorine solution (about 1 ounce of a commercial 5 percent liquid chlorine bleach such as Clorox® per gallon of water) to help destroy bacteria. Brushing the fruit in the wash water further aids in removing dirt and microorganisms. Some bacteria naturally adhere to the apple. Other sources are dust, dirt, rain, insects and animal or bird droppings. Droppings can be an especially important contributor if “drops” (apples that were on the ground) are used in the cider.

   While no one can guarantee the absolute safety of fresh cider, there are ways to minimize the risk. Never use drops for cider. Use only good-quality fruit that has been harvested from the tree and take steps to maintain the fruit quality and enhance its cleanliness.

   Improperly cleaned equipment can be a source of contamination for the cider. Remember to wash equipment immediately after use, but also sanitize it immediately before use. Washing will remove residues that may serve as a media upon which contaminants may grow. Sanitizing will destroy any contaminants that may exist on the equipment. **Washing is not the same as sanitizing**. Use a chlorine solution (bleach at the rate of 2 ounces per 10 gallons of water) to sanitize equipment and rinse with fresh water. This should be done on a routine basis. Do not let this solution stand in your equipment and lines for more than two to three minutes, since pitting of stainless steel will occur. Thoroughly rinse with fresh water at least two times following use of the sanitizing solution.
4. *Grinding*. The finer the fruit is ground before pressing, the more cider will be collected. Grinding serves to break cell walls and release the liquid inside. The finer-ground fruit will make cider that is darker and more cloudy than coarser-ground apples.
5. *Pressing.* This step involves applying sufficient pressure to the ground apple pulp to force the liquid contents out. Several different types of presses exist. Small, hand-operated presses work well when only a few gallons of cider are being made. Commercial producers may elect to use a rack and cloth or a squeezebox press. Larger operations may choose to purchase a continuous press, which has more capacity and requires fewer people to run it effectively than those previously mentioned.

   The amount of cider obtained from one bushel of apples is dependent on fruit variety, stage of fruit maturity, type of press and operator experience. On the average, one bushel of apples should yield about 3 to 3 1/2 gallons of cider. Small, hand-cranked presses will not yield as much cider per bushel of apples as larger power presses.
6. *Filtering and sedimentation*. Once the apple pulp has been pressed, the cider should be collected, filtered to remove larger solids and stored for 12 to 24 hours at temperatures around 32 degrees F to allow sedimentation to occur. Apple cider always contains solids and will never clear up entirely.

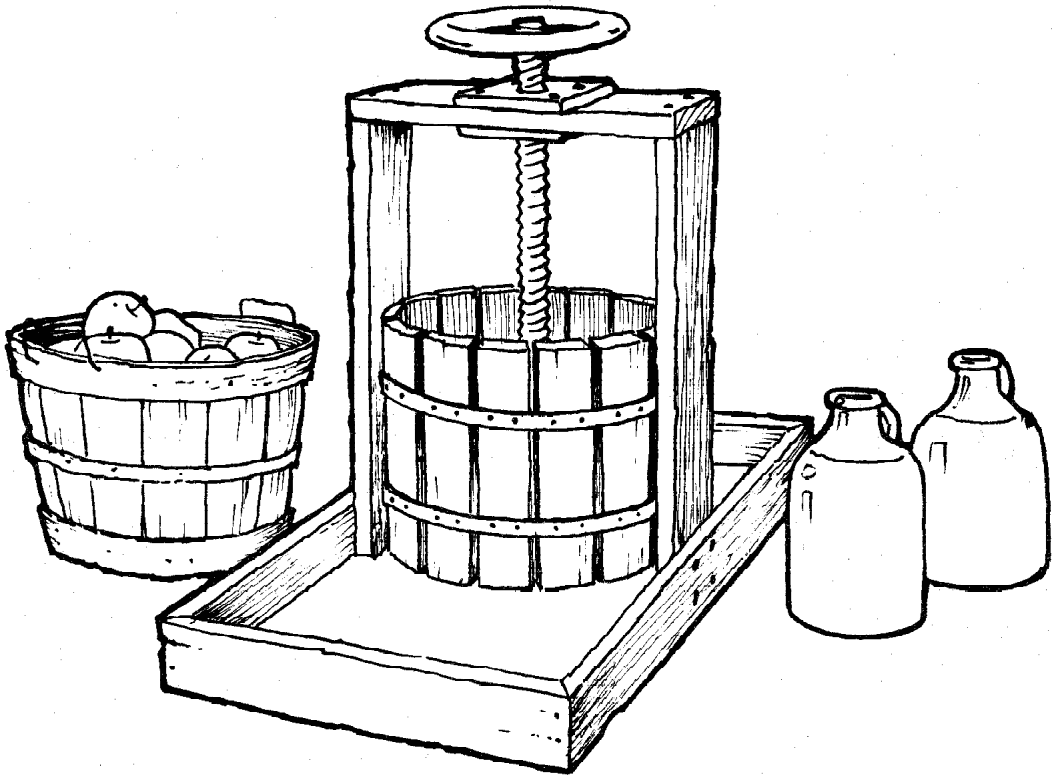
7. *Jugging*. Once sedimentation has been completed, the cider should be bottled. Be sure to purchase clean containers and keep them clean. If the cider is to be refrigerated, containers should be filled completely. If the cider is to be frozen, containers should only be filled about 90 percent full. This head space must be present to allow for expansion that will occur during freezing.
8. *Storage*. Fresh apple cider will only last a very few days when stored at room temperature. To increase shelf life, cider should be refrigerated. It will retain its quality up to two weeks when stored at 32 to 36 F. For best results, cooling should begin immediately after pressing. Apple cider may be frozen and held up to a year or longer with no deterioration in quality.
9. *Cleanliness*. A cider pressing operation is a food processing operation. Commercial operations must meet the same standard Good Manufacturing Practices (GMPs) as any other food processing plant. All persons working in such operations should wear clean clothes/outer garments and maintain a high degree of personal cleanliness. All persons should wash hands thoroughly before starting work and after each absence in accordance with the most recent Food Code, U.S. Public Health Services, FDA, Section 2-301.14. While adherence to these standards applies to any cider that will be sold, the same care should be exercised even when making cider for personal consumption. Efforts should be made to exclude insects and rodents while the cider is being made, stored and jugged.

Consequences of Improper Storage

Since pure apple cider contains no preservatives, improper storage can lead to a serious degradation in quality within a short period of time. If air cannot enter the container, cider will ferment and produce low levels of alcohol. Gases given off during the fermentation process will cause an increase in pressure within the container, possibly resulting in the top blowing off or the container rupturing.

If exposed to air, the final result may be the cider turning to vinegar or becoming moldy. Be aware that the vinegar formed in this manner is of poor quality when compared to apple cider vinegar made under carefully controlled conditions. This vinegar should not be used in canning foods that require the addition of vinegar.

For more information on the use of apples and related products, contact your county Extension office.



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Billy G. Hicks, Dean