PEACHES: VALUE-ADDED FOOD PRODUCTS

By
Stephanie A. Smith, Consumer Food Safety Specialist, Washington State University. **Ilce G. Medina-Meza**, Assistant Professor, Michigan State University. **Girish Ganjyal**, Extension Food Processing Specialist, Washington State University

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Peaches: Value-Added Food Products

Peaches (Figure 1) are a very nutritious fruit, grown in the state of Washington, and typically harvested between the months of June through September. Peaches are consumed as fresh fruit, as puree, mousse and smoothies, as topping for yogurt, ice cream, cereals, pancakes, or waffles, and as a filling for pies, tarts, cobblers, or strudels. Washington State produced 13,100 tons of peaches in the year 2013, with a market value of $770 per ton (USDA 2014). Peaches are low in saturated fat, cholesterol, and sodium. They are a good source of dietary fiber. Furthermore, they have more vitamin C (11%) than nectarines and more vitamin A (7%) than pears (USDA 2015).

Figure 1. Peaches can make great value-added food products.

What is a Value-Added Product?

Value-added products are defined by the United States Department of Agriculture (USDA) under 7 CFR 4284.902 (Code of Federal Regulations Title 7, Chapter 4284, part 902) as follows:

1. The agricultural commodity must meet one of the following five value-added methodologies:

- Has undergone a change in physical state (such as making strawberries into jam or jelly).
- Was produced in a manner that enhances the value of the agricultural commodity.
- Is physically segregated in a manner that results in the enhancement of the value of the agricultural commodity.
- Is a source of farm or ranch-based renewable energy.
- Is aggregated and marketed as a locally produced agricultural food product.

2. As a result of the change in physical state or the manner in which the agricultural commodity was produced, marketed, or segregated:

- The customer base for the agricultural commodity is expanded, and
- A greater portion of the revenue derived from the marketing, processing, or physical segregation of the agricultural commodity is available to the producer of the commodity.

Value-added products can open new markets, enhance the public's appreciation for farms, and extend the marketing season for farm produce.

Historical and Agronomical Overview

Peaches have been cultivated since the early days of Chinese culture. Peaches were brought to America by Spanish explorers in the sixteenth century and eventually made it to England and France in the seventeenth century. Various American Indian tribes are credited with migrating the peach tree across the United States, taking seeds along with them and planting as they roved the country. By the mid-1700s, peaches were so plentiful in the United States that botanists thought of them as native fruits. Although Thomas Jefferson had peach trees at Monticello, United States farmers did not begin commercial production until the nineteenth century in Maryland, Delaware, Georgia, and finally Virginia (Clemson 2016).

Production and Market

There are two major varieties of peaches: Clingstone and Freestone. Freestone peaches are ideal for fresh consumption since it is easier to separate the pit from the flesh. Freestone peaches are also popular for home canning. Clingstone peaches have flesh that clings to the stone, and it is very difficult to separate the two halves of a cut peach (Clemson 2016). Freestone peaches are mostly larger and firmer than Clingstone peaches.

While peaches are a tasty, fresh snack eaten whole, chopped, or sliced, many peaches grown in the Unites States, and in the state of Washington, are processed into value-added products allowing processed peaches to be available year round. In 2014, total production of peaches in the US was 852,939 tons, of which 393,320 tons were consumed fresh and 444,707 tons were processed. The majority of processed peaches were canned (330,220 tons), while the rest were either frozen (95,290 tons) or dried (4,700 tons). Jams, syrups, juices, and peach slices are other common uses for this fruit. In 2014, California was the largest producer of peaches (191,200 tons) followed by South Carolina (59,300 tons) (USDA 2014).

Health Benefits

Peaches contain phenolic compounds (84.07 mg gallic acid/100 g fresh fruit) and high levels of antioxidants such as carotenoids; in particular, beta-carotene (430 micrograms kg fresh weight) and crytoxanthin (70 micrograms kg fresh weight) which combat cell radicals that cause damage to body cellular structures (National Nutrient Database 2016; Table 1). Peaches are also a good source of Vitamin C, which helps the body develop resistance against infectious agents. The phenolic content was found to be higher in the peels than the flesh of the peach (O’Shea et al. 2012).

Table 1. Nutrition Facts (National Nutrient Database 2016)

Principle	Nutrient Value
Energy	39 kcal
Carbohydrates	9.54 g
Protein	0.91 g
Total Fat	0.25 g
Cholesterol	0 mg
Dietary Fiber	1.50 mg
Vitamins	
Folates	4 µg
Niacin	0.806 mg
Riboflavin	0.031 mg

Thiamin	0.024 mg
Vitamin A	326 IU
Vitamin C	6.6 mg
Vitamin K	2.6 µg
Electrolytes	
Sodium	0 mg
Potassium	190 mg
Minerals	
Calcium	6 mg
Iron	0.25 mg
Manganese	9 mg
Phosphorus	20 mg
Zinc	0.17 mg

Values are per 100 g of serving.

Preservation Techniques for Peaches

Why do we need to preserve the food?

Since peaches have a very short shelf life, preserving them reduces waste and allows for them to be available year round in some form. Preservation of peaches provide microbial safety and stability, and maintain the sensory and nutritional quality of the food. Preservation is based on the delay or prevention of microbial growth through different factors, such as: temperature (low or high), water activity (a_w), acidity (pH), preservatives (e.g., nitrite, benzoate, sorbate, and sulfite) (Ibarz and Barbosa 2003). The most common preservation techniques for peaches include: drying/dehydrating, canning, and freezing.

Drying/Dehydration

Dehydration is the oldest technique of food preservation. The water is removed using warm air but not using very high heat, permitting the fruit to retain its food value and flavor. It commonly takes 6-20 hours for peaches to dry by this method. Drying helps to reduce the water activity of the fruit, thus increasing food safety by decreasing the risk of spoilage by molding (Ibarz and Barbosa 2003).

What drying technique is best for you?

Oven Drying

Use of temperatures below the 93°C (<200°F) will have good results. It is important to have good air circulation during the drying process (University of Illinois 1984).

Electric Dehydrating

This is the best method of dehydrating food. An electric dehydrator (Figure 2) or dryer is energy efficient and can be operated at low temperatures needed to maintain nutritive values in the food. Electric dehydrators also provide better control of the drying process and thus more uniformity of the food products. When purchasing an electric dehydrator, look for a dehydrator with the following components: heat source, temperature control, and fan (University of Illinois 1984).

Figure 2. Electric dehydration of peaches.

Sun Drying

This technique uses the natural energy from sunlight to dry the product. Generally thin layers of fruit are exposed to sunlight. This is an easy preservation technique, but comes with certain drawbacks (University of Illinois 1984), such as:

- Non-uniform drying
- No control over the energy input, as there may not be series of days with constant sunlight and it generally requires three to four consecutively sunny days of at least 37°C (99°F)
- Poor sanitation of product (e.g., dust, insects, animal droppings)

Osmotic dehydration

In this method, the fruit is immersed in a hypertonic solution (such as a concentrated sugar solution). During this process the water and small amounts of natural solutes (such as pigments) are transferred from fruit to the solution and the solute is transferred from the osmotic solution to the fruit in a countercurrent manner (University of Illinois 1984).

Freeze drying

This is a generally a more expensive process. This technique has mainly two stages. In the first stage, water present in the fruit is cooled by refrigeration until it turns into frozen water. The next stage reduces the surrounding pressure to allow the frozen water in the material to change directly from the solid phase to the gas phase (National Nutrient Database 2016; Ibarz and Barbosa 2003).

Canning

Canning is a food preservation technique developed by Nicolas Appert in 1809. In this process the food contents are processed and sealed in an airtight container. At high temperature, heat forces air to leave the jar or the can, and when the jar cools, it will "seal." Once the jar or can is sealed, no bacteria can enter the can container. Thus, these are also referred to as hermetically sealed containers (Ibarz and Barbosa 2003).

Boiling-water Canning

This technique is used for canning high acid foods such as fruits and pickles. The kettle should be large enough to hold a jar rack and allow the jars to be covered with 1-2 inches of water. Process times vary depending on the size of jar used, initial temperature of the product, ratio of the solid to liquid brine and the altitude at which the canning is occurring. It is always recommended to consult with a process authority to determine the adequate thermal processing parameters for the product (Ibarz and Barbosa 2003).

Pressure Canning

This technique is commonly used to can low acid foods such as vegetables, soups, and meats. The pressure canner has a lid which locks down tight and creates high pressure within the vessel. The pressure and temperatures within the kettle are high enough to kill bacteria that can cause botulism. It is always recommended to consult with a process authority to determine the adequate thermal processing parameters for the product (Ibarz and Barbosa 2003).

Cooking

This is a more traditional method of preservation. The term cooking is a broad one. The type and number of products that can be made with peaches is vast. Depending on the extent of cooking, the temperatures and times used, and the different ingredients added, the final product may have different end result. The shelf-life of the final product will depend on the final product characteristics such as pH, water activity, processing time, temperature product is processed at, and ingredients added.

Make Your Own Value-Added Products from Peaches!

Below are some of standard recipes that have been tested and reported (Andress and Harrison 2014). For information on how to can food for home preservation, please contact your local Extension office.

Slice canned peaches (Makes 7 quart jars)

- 5 lb peaches
- 1 tsp. ascorbic acid
- 1 1/4 – 3 3/4 cup sugar for syrup
- apple juice or white grape juice (if not using a syrup)

Directions

1. Dip fruit in boiling water for 30 to 60 seconds until skins loosen. Dip quickly in cold water and slip off skins.
2. Cut in half, remove pits and slice if desired. To prevent darkening, keep peeled fruit in ascorbic acid solution (1 tsp per gallon of water).
3. Prepare and boil a very light, light, or medium syrup (Table 2) or pack peaches in water, apple juice, or white grape juice. Raw packs make poor quality peaches.
4. In a large saucepan place drained fruit in syrup, water, or juice and bring to boil.
5. Fill hot, sterile jars with hot fruit and cooking liquid, leaving a 1/2-inch of headspace. Place halves in layers, cut side down.
6. Remove air bubbles. Wipe rim. Center hot lid on jar. Apply band and adjust until fit is fingertip tight.
7. Put the jars in a boiling water canner for 25 minutes, adjusting for altitude.
8. Remove jars and cool. Check lids for seal after 24 hours. Lid should not flex up and down when center is pressed.

Table 2. Preparing syrups.

Syrup Type	Approximate % Sugar	Cups of Water	Cups of Sugar
Very light	10	10 1/2	1 1/4
Light	20	9	2 1/4
Medium	30	8 1/4	3 3/4

Peach Jam (Makes 6 half pint jars)

- 3 3/4 cups crushed peaches (about 3 lb peaches)
- 1/4 cup lemon juice
- 1 package powdered pectin
- 5 cups sugar

Directions

1. Wash and peel peaches, and remove pits and stems. Coarsely chop peaches, and then crush with a potato masher.
2. Measure crushed peaches into a kettle. Add lemon juice and pectin; stir well.
3. Place on high heat and, stirring constantly, bring quickly to a full boil with bubbles over the entire surface.
4. Add sugar, continue stirring, and heat again to full bubbling boil. Boil hard for 1 minute, stirring constantly. Remove from heat; skim.
5. Fill hot jam immediately into hot, sterile jars, leaving a 1/4 inch of headspace. Wipe rims of jars with a dampened clean paper towel; adjust two-piece metal canning lids.
6. Process in a boiling water canner for 5 minutes, adjusting for altitude.

Peach Jelly (Makes 5-6 half pint jars)

- 3 cups prepared peach juice (about 3 1/2 lb of peaches and 1/2 cup of water)
- 5 cups sugar
- 1/2 cup lemon juice
- 1 box powdered pectin

Directions

1. Wash and slice peaches (do not pit or peel). Crush fruit.
2. Place crushed fruit and 1/2 cup water in a saucepan. Bring to boil. Reduce heat, cover, and simmer 5 minutes, stirring occasionally.
3. Place prepared peaches in several layers of dampened cheesecloth or a jelly bag. Let juice drip undisturbed.
4. Measure juice into a large saucepan. Add pectin and lemon juice to the saucepan. Measure sugar and set aside.
5. Bring contents in saucepan to a full boil over high heat, stirring constantly.
6. All at once, stir in sugar. Bring to a full rolling boil that cannot be stirred down. Boil hard for 1 minute, stirring constantly.
7. Remove from heat and quickly skim off foam.
8. Ladle hot jelly into hot, sterile jars leaving a 1/4 inch of headspace. Wipe rim. Center lid on jar. Apply band until fit is fingertip tight.
9. Put the jars in a boiling water canner for 5 minutes, adjusting for altitude. Remove jars and cool. Check lids for seal after 24 hours. Lid should not flex up and down when center is pressed.
   …peaches can also be added to ice creams, and baked goods, among others.

Food Safety Considerations

Before trying any preservation technique, you should consider the following:

pH

Acidity is an important quality attribute of fruits. Acidity changes during ripening, decreasing as fruit ripens, and fruit becomes sweeter, less green, and softer. pH may be defined as a measure of free acidity. Acids present in foods release hydrogen ions, which give acid foods their distinct sour flavor. Generally, pH ranges from zero to 14. A pH value of 7 is neutral, and pure water has a pH value of exactly 7. Values less than 7 are considered acidic, while those greater than 7 are considered basic or alkaline. Very low or high pH values will prevent microbial growth. Fruits usually have a low pH value. Peaches have naturally high acidity, and their pH is around 3-4 (US FDA/CFAN 2004).

Water Activity

Water activity is the amount of unbound water in food that can support the growth of microorganisms. Water activity is not related to the amount of moisture content of a food; however, items with high moisture content often have high water activity. The water activity scale ranges from 0 to 1.0 with pure water having a water activity of 1.0. Pathogenic microorganisms (those causing disease) cannot grow when the water activity of a food is below 0.86. Peaches have very high water activity, but dehydration of peaches, and preserving peaches as jams and jellies, can help reduce the water activity (UC Davis 2016).

Some Associated Regulations

The food safety regulations associated with making of the value-added products described in this fact sheet include:

Acidified/Low-Acid Canned Foods

CFR 113, 114 – Canning (acidified, low-acid)

Jams, Jellies

The FDA Code of Federal Regulation title 21 (21 CFR 150.160) for fruits preserves and jams give you all definitions and standards for fruit preserves (Code of Federal Regulations 21CFR150.60).

- 150.110 Fruit butter.
- 150.140 Fruit jelly.
- 150.141 Artificially sweetened fruit jelly.
- 150.160 Fruit preserves and jams.
- 150.161 Artificially sweetened fruit preserves and jams.

Good Manufacturing Practices

It is strongly recommended that value-added food producers become familiar with the Good Manufacturing Practices (GMP) regulations (21 CFR 110 and now 21 CFR Part 117 Subpart B for human food good manufacturing practices), which apply to all processed food products. Note that GMP regulations in 21 CFR 110 move to 21 CFR 117 Subpart B with different compliance dates based on facility size.

For additional information about value-added food processing and food safety information, please visit the Food Processing Extension & Research website at http://foodprocessing.wsu.edu or the Consumer Food Safety website at http://extension.wsu.edu/foodsafety/.

References

Andress, E.L., and J.A. Harrison. 2014. So Easy to Preserve. Cooperative Extension, The University of Georgia, Athens. College of Family and Consumer Sciences. College of Agricultural and Environmental Sciences. Bulletin 989

Code of Federal Regulations.

Code of Federal Regulations. Title 21–food and drugs, chapter I–food and drug administration department of health and human services, subchapter b–food for human consumption, Part 150, fruit butters, jellies, preserves and related products.

Clemson. 2016 Everything About Peaches.

Ibarz, A., and G. Barbosa. 2003. Unit Operation in Food Engineering. 2003. Florida, CRC Press.

National Nutrient Database. 2016. Basic Report, Peaches, Yellow, Raw.

O’Shea, N., E. Arendt, E. Gallagher. 2012. Dietary Fiber and Phytochemical Characteristics of Fruit and Vegetable By-Products and Their Recent Applications as Novel Ingredients in Food Products. *Innovative Food Science and Emerging Technologies* 16: 1–10.

University of Illinois. 1984. Drying Food. University of Illinois at Urbana-Champaign Cooperative Extension Service. Circular 1227.

USDA. 2014. 2014 Washington annual statistical bulletin.

USDA. 2015. Non-Citrus Fruits and Nuts 2015 Summary. United States Department of Agriculture. National Agricultural Statistics Service. July 2016.

UC Davis. 2016. Water Activity in Food. http://drinc.ucdavis.edu/dairychem4_new.htm

US FDA/CFAN. 2004. Approximate pH of Food and Food products. US FDA/CFAN.

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