

## AMI Day 5 Agriculture Classes - Mrs. Moore

### Food Science. Maple Syrup Production.

1 Maple sugar is a sweetener that is made from the sap of maple  
trees. It can be used as an ingredient in baking, boiled into syrup,  
whipped into a cream, or concentrated into a hard candy. Today, the  
most common form of maple sugar is maple syrup. Many imitation  
forms of maple syrup exist for purchase at grocery stores. As a  
5 natural food, maple sugar has many uses.

The maple sugaring process was originally discovered by  
Native Americans who would cut the bark of a maple tree. They  
collected the sap in hollowed logs as it dripped out of the tree. Hot  
10 stones would be added to the sap in order to boil the water, leaving  
thick sugar crystals that would not spoil during storage. These Native  
Americans shared their process of producing maple syrup with the  
European colonists, who used tin buckets to collect the sap from the  
plentiful maple trees.

15 While all trees produce sugary sap, only a few species have a  
high enough sugar concentration to be used efficiently for syrup.  
While the Sugar Maple, *Acer Saccharum*, is the most widely used tree  
species used for making syrup, black maples, silver maples, red  
maples, box elders, hickories, and birch trees can also be used. Only  
about five percent of the tree's total sap is used for making syrup, so  
20 there is plenty left for the tree to use during its growing process.

Maple sap contains mostly water. Sucrose is the major sugar  
component that is produced by the plant through the process of  
photosynthesis. In the fall, the sugars that are produced from  
25 photosynthesis are transported by the tree into the roots as starches,  
where they help the plant survive the cold winter. In early spring  
between February and April, the starches are converted to sugar and  
are transported to the twigs and leaf buds where they help the plant  
produce new growth. Sap flows throughout the tree during the entire  
30 growing season, but only the sap that is present during the early  
spring is used for syrup production. The sugars in the sap help keep  
the tree from freezing during the winter.

The sap from many maple trees is required to make maple  
syrup. It takes about forty gallons of sap to make one gallon of maple  
35 syrup. One gallon of syrup weighs about eleven pounds. When first  
collected, sap is nearly colorless, almost tasteless, and low in sugar  
content. The best days for sap collection are days that are warm

during the day and cold during the night.

40 The process of making maple syrup begins with a tree that is at  
least 10 inches in diameter. A small hole that is about two inches  
deep and about a half inch in diameter is drilled into the tree. A spile  
is a hollow spout that is inserted into the hole. A galvanized  
collection bucket is hung from the spile. It is important to collect the  
45 sap within a day of being collected in order to prevent it from  
fermenting. The sap is collected in a big storage tank where an  
evaporator is used to boil the water out of the syrup. The syrup can be  
boiled down further to remove additional water, making maple candy.

50 The evaporator uses a heat source, most often a wood furnace,  
to heat the sap. Heavy cast iron grates are used to hold the fire out of  
the ashes. The sap holding tank is above the fire. The sap flows by  
gravity down to the flue pan where the amount of sap that enters is  
controlled by a float valve. When the sap flows through the flue pan,  
it enters the syrup pan, which has a flat bottom. This is where the  
55 maple syrup is boiled to the proper sugar concentration. It is  
important to keep the syrup moving in the evaporator in order to  
prevent burning. The evaporator heats the sap to 185 degrees  
Fahrenheit.

60 Today, plastic tubes can be used for transporting the tree sap to  
collection tanks in a sugar house. A sugar house is the term used to  
name the building where sap is boiled and maple syrup is produced.  
Usually gravity and the internal pressure of the tree force the sap into  
the collection buckets, but a system that uses a vacuum pump can also  
be used.

65 Pure maple syrup is a relative delicacy, and it is good for your  
health. Pure maple syrup contains more minerals than honey. It also  
contains fewer calories than honey. Pure maple syrup is an excellent  
source of manganese and a good source of zinc. Manganese is an  
antioxidant, which contributes to cancer prevention. Zinc slows the  
progression of arteriosclerosis, a disease affecting arterial blood  
70 vessels. Both zinc and manganese help the body's immune system  
fight illness and disease.

Write the letter of the answer choice on your answer sheet.  
We will input them into Google Classroom when we return to school.

1. According to the passage, who is credited with discovering maple syrup?
  - a. *Acer Saccharum*.
  - b. Europeans.
  - c. Vikings.
  - d. Native Americans.
2. Which species of maple tree is the most widely used for maple syrup production?
  - a. Red maple.
  - b. Black maple.
  - c. Sugar maple.
  - d. Norway maple.
3. How many gallons of sap are required to produce one gallon of pure maple syrup?
  - a. 10.
  - b. 11.
  - c. 40.
  - d. 185.
4. What is the major sugar produced during photosynthesis?
  - a. Fructose.
  - b. Glucose.
  - c. Maltose.
  - d. Sucrose.
5. When processing sap to make pure maple syrup, what is the waste product?
  - a. Carbon dioxide.
  - b. Water.
  - c. Fire.
  - d. Stiles.
6. Sap collected in tubes uses gravity and the tree's internal pressure. What is causing this internal pressure?
  - a. Gravity.
  - b. Trees moving sugars from roots to limbs for leaf production.
  - c. Moon cycles, similar to what produces ocean waves.
  - d. The thawing of soils in spring.
7. What percentage of the tree's sap is collected to be used for maple syrup production?
  - a. 5%.
  - b. 10%.
  - c. 25%.
  - d. 50%.
8. What is the purpose of sap in trees?
  - I. It carries pure maple syrup from the leaves to the roots.
  - II. It carries the chlorophyll from roots to the leaves of plants, like our skin pigments.
  - III. It carries water and nutrients throughout the tree, similar to our blood.
  - a. I only.
  - b. II and III only.
  - c. I and II only.
  - d. III only.

- 9.** Although the first paragraph indicates that imitation versions of maple syrup exist, what is the purpose of the final paragraph?
- a.** To explain the process of maple syrup production.
  - b.** To provide evidence to persuade the reader to purchase pure maple syrup.
  - c.** To argue against tapping trees for maple syrup production.
  - d.** To demonstrate the value of maple syrup to forest ecosystems.
- 10.** What is the major sugar produced during the process of making pure maple syrup?
- a.** Fructose.
  - b.** Glucose.
  - c.** Maltose.
  - d.** Sucrose.

Name \_\_\_\_\_ Date \_\_\_\_\_ Class Period \_\_\_\_\_

AMI Day 5 Answer Sheet

Directions: After reading the short article, answer the multiple choice questions. Select the best answer from the choices provided and write the letter on this sheet.

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