



An Apple of an Adventure!

Middle School Food and Agricultural Literacy Curriculum

Precepts

- J. Mental Growth
- J2. Think creatively

National Standards

- PS.03.05.01.a. Identify harvesting methods and harvesting equipment.
- PS.03.05.04.b. Demonstrate techniques for grading, handling, and packaging plants and plant products for distribution.
- FPP.04.03.03.b. Explain the processes of food preservation methods.
- NL-ENG.K-12.5 – Communication Strategies
- NL-ENG.K-12.6 – Applying Knowledge
- NL-ENG.K-12.12 – Applying Language Skills
- NS.5-8.2 – Physical Science
- NS.5-8.5 – Science and Technology
- NS.5-8.6 – Personal and Social perspectives

Student Learning Objectives

- As a result of this **unit**, the student will be able to...
Examine processes involved in food science.
- As a result of this **lesson**, the student will be able to...
List the main processing steps in edible plant products.

Content Outline

Objective 1. List the main processing steps in edible plant products.

I. Main processing steps in plant products

- A. Harvesting
 - 1. Most plants are harvested in the fall in the United States.
 - 2. Fruits and vegetables are tested for maturity by checking firmness and color. If they are mature, they are picked by hand or mechanically from their growing location.

Time:

Instruction time for this lesson: 45 minutes.

Resources

National FFA Organization. (2009). LifeKnowledge Online. Retrieved September 1, 2009 from <http://agedlearning.org> — Hayes, K. *Introduction to Food Science*, Purdue University CopyMat, 2005.

Tools, Equipment, and Supplies

- Apples – one per student, or one per group
- Raisins, marshmallows, toothpicks, licorice, and other materials desired for creating apple characters
- Paper
- Writing surface
- Writing utensil
- MS.FS.2.4.TM.A – one per teacher
- MS.FS.2.4.TM.B – one per teacher
- MS.FS.2.4.ASSESS.A – one per student

Key Terms

The following terms are presented in this lesson and appear in **bold italics**:

Core

B. Reception

- 1. The plant products are hauled by truck to the processing plant.
- 2. At this point, they are inspected visually for any blemishes that may cause an issue with integrity or sanitary issues.

C. Size and Grading

- 1. Fruits and vegetables are first sorted by size and separated out based upon dimension and firmness.
- 2. After they are sized, they are graded based on appearance and internal quality, which consists of any errors in color, external blemishes, or firmness of the plant product.

D. Washing

- 1. External dirt and chemicals left on the peels are removed through a water bath.
- 2. After this, water spraying and scrubbing may take place for further cleanliness.

E. Peeling and **Coring**

- 1. Using a machine, the peel and **core** can be removed from the plant product or left on depending on product uses. The **core** is the center part of the fruit containing the seeds.



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2. This can also be done by hand using a paring knife, but is not completed by hand in large processing plants.
- F. Slicing
 1. Processed plant products are then sliced into even sizes by machine.
- G. Preserving
 1. The sulfuring process prevents browning of fruits and vegetables. This takes place in a factory using chemicals.
 2. Coating apple cuts, slices and dices with a solution of 50% water and 50% lemon juice discourages the browning process.
- H. Drying
 1. Large dehydrators are set at high temperatures to remove water from the plant products.
 2. They are then dried to desired crispness. Some products can still be pliable while others can be of potato chip consistency.
- I. Temporary Storage
 1. Once fruits & vegetables are dried, they are placed in temporary storage for packaging.
 2. From temporary storage, products will travel down a conveyor into sorting for packaging.
- J. Packaging
 1. Fruits and vegetables that are preserved are placed in airtight plastic bags for storage and shipment.
 2. Those that have not been preserved are packaged among soft crate trays or bags to minimize bruising and spoiling.
- K. Shipping
 1. Fruits and vegetables are then packaged and shipped in crates to destinations based upon variety and local demand.

Interest Approach

Provide each small group of students with an apple. (Consider having enough apples to give to each student to eat after the activity or after the lesson is complete.) Provide toothpicks, marshmallows, raisins, licorice, and any other items that could be fun and interesting to work with. The objective is to create a "Mr. Apple Head." The students will then create a story-line on a sheet of paper describing what life was like for that apple, beginning from hanging on the tree to being in the room. They will be asked to share their stories in 90 seconds or less. Have the room set up and apples placed accordingly.

Welcome to class, everyone! Today we are going to do a little storytelling. Usually students bring apples to the teachers but this time the teacher is bringing apples to you. Have you heard the expression, "The apple doesn't fall far from the tree?"

Pause and wait for a response. Explain the meaning behind the expression if some students are unaware of its meaning.

Well, the apple in front of us didn't just appear here, though. It has a story. And before we can learn about the apple's story, we need to first create its main character. Using the materials provided, along with your imaginations, transform your apple into Mr. or Mrs. Apple Head. We will use these characters to create stories.

If there are not enough apples for students to eat at the end, remind students to be gentle with the apples for this reason.

Let's take four minutes to create our apple characters.

Provide four minutes for students to create their characters.

Hold up your apple, and take a look around at others'. If you see one you like, say, "Nice work, my friend."

Allow students to pan the room and compliment others' work.

Somehow, this apple made it to our classroom today and everyone should learn of its journey. When I say GO, create a story on the paper provided describing how you think your apple made it here -starting from hanging on the tree



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– to what it went through, physically (and maybe emotionally) to be here now. We will take five minutes to create our stories. When our 5 minutes has expired, we will share our stories. What questions are there? GO!

Give students five minutes to create their stories.

Great work authoring your apple's story. Now we should give our apples the credit they deserve by sharing their remarkable stories. Let's each give our apples 90 seconds of fame by sharing their stories with everyone.

Have a few students share their story with the entire class.

We have heard some amusing and interesting stories of what apples encounter from tree to table. Today, we'll take a closer look at the food processing system. When we finish, we'll see how our characters taste! Be prepared to get moving and work diligently throughout today's lesson.

Summary of Content and Teaching Strategies

Objective 1. Describe the main processing steps in edible plant products

Utilize transparency master **MS.FS.2.4.TM.A** to aid in introducing and reviewing these steps as well as the *Motion e-Moment®*. For each of these steps, create a motion that represents that step or process. It is more meaningful for students when they create the motions but it will be helpful to them if you model this idea before they begin. Review previous motions as a new motion is added to reinforce their memory. Allow the students to create the motions (and maybe add sounds) to allow them ownership over the content.

It's time to put processing in motion! As we travel through the processing steps we see listed, it's essential that we commit this process to memory. To help remember the steps, we are going to create motions that coincide with each step. How can I clarify this? Let's get moving along the processing steps of plant products!

Display Harvesting information on **MS.FS.2.4.TM.A**

Our first process is harvesting. Let's create our first motion together so that we all understand what we should do. For harvesting we could swing a reaper or shuck a corn cob.

Demonstrate motion.

Let's all try this motion together!

Have students do this together.

Let's try reception!

Display reception information on **MS.FS.2.4.TM.A**

Who's feeling receptive to demonstrating a motion for reception?

Solicit student responses.

Awesome! Now let's try this as a class.

Have students do this together.

Before we move ahead, we need to review the motions in the order we learned them.

Review first and second motions.

It's time to try a new motion on for size and grading!

Display size and grading information on **MS.FS.2.4.TM.A**

Who will create a motion for this?

Solicit student response. By this time, the class should now be doing the motion together without solicitation.

Let's string these three motions together.

Review motions and continue to review motions in this manner.

This next motion shouldn't be a wash!

Display washing information on **MS.FS.2.4.TM.A**

What motion can we use for washing?

Solicit student response. Solicit class response.



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Raise your hand if you remember all of the motions so far. Who will be the one to lead the review of our motions completed?

Solicit student volunteer. Provide assistance if necessary.

Great job! Let's continue to peel away at these processes. Who has a motion for peeling and coring that they would like to share?

Solicit student response. Solicit class motion.

Let's continue adding to the **core** of our notes by placing this information in our notebooks.

Display peeling and coring information on **MS.FS.2.4.TM.A**

Let's continue to slice and dice these processes and slice through this next line in our notes.

Display slicing information on **MS.FS.2.4.TM.A**

Who will create a motion for slicing?

Solicit student response. Solicit class motion.

Preserving.

Display preserving information on **MS.FS.2.4.TM.A**

What motion will preserve this term in our minds?

Solicit student response. Solicit class motion.

Let's not leave the class hanging out to dry.

Display drying information on **MS.FS.2.4.TM.A**

What motion can demonstrate drying?

Solicit student response. Solicit class motion.

It's time to store away another motion.

Display temporary storage information on **MS.FS.2.4.TM.A**

Who can demonstrate temporary storage in action?

Solicit student response. Solicit class motion.

Let's pack this baby up!

Display packaging information on **MS.FS.2.4.TM.A**

What is a motion that we could use for packaging?

Solicit student response. Solicit class motion.

And lastly, let's ship these motions to our minds.

Display shipping information on **MS.FS.2.4.TM.A**

Who can provide the last motion for shipping?

Solicit student response. Solicit class motion.

Now that we've created these motions, let's run through this one more time.

Start from the beginning, leading the motions and checking for understanding.

Just as there are strategies for maintaining food quality during processing, there are strategies that help us remember new information.

Review/Summary

Using the *Voice Modulator e-Moment*, have students say the steps out loud while they complete the motions they created. In the *Voice Modulator e-Moment*, students change their voices using distinction in their intonation, volume, accent, or tone change to accompany the steps and the motions. These changes can also imitate people such as a cheerleader, an old man, Darth Vader, etc., and each step should have its own unique sound.

Using the motions we created for each process, let's add some variation to make the process even more memorable. We will make each step more memorable by not only doing the motion for each step, but also by stating the steps out loud... in a more creative way. When we think about the motion and process, they go hand-in-hand but we are going to put another spin on memorizing the steps. When we say the steps out loud, we need to change our voice using a combination of methods. Those methods are altering the intonation, volume, accent, or tone.

For example, the first step is harvesting. Since harvesting occurs in the fall, we might begin saying the word at a higher volume than normal then let our voices drop or "fall" by the end of the word while we do our motion of shucking corn.



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What questions do you have?

Let's create unique sounds for each of the steps. Make sure that the motions and the sounds go together to commit the steps to memory.

Allow time for students create sounds and to present if time allows.

We created entertaining pathways for our apples to travel, discovered the processes that fruits and vegetables must travel, and created awesome recruitment strategies for our FFA chapter. We will continue discussing processes tomorrow as we discover how milk flows from the cow to the carton!

Application

Extended classroom Activity:

Process various plant products to create homemade salsa in class. Recipes can be found at <http://www.great-salsa.com/>. Making jam or other plant-based products is an option; additionally, students could watch video on fruit or vegetable processing.

FFA Activity:

The Food Science CDE allows students to create a food product and present it to judges at the state and national level. Allow students to discover this portion of the Food Science CDE by having them create a new food product, listing the processing techniques needed to create it.

SAE Activity:

As middle school students, throughout SAE activities, students should be developing an SAE on an exploratory basis. Students may harvest fruit and vegetables at a local orchard, process fruits or vegetables through canning, sell fruit or vegetables at a local farmer's market or vegetable stand. Students can then write a plan on how they could start a fruit or vegetable SAE.

Evaluation

MS.FS.2.4.ASSESS.A

Answers to Evaluation

1. The core is the center part of the fruit containing the seeds.
2. A
3. Color, size, firmness, appearance, dimension
4. A
5. B



Main processing steps in plant products

Harvesting

- Most plants are harvested in the fall in the United States
- Fruits and vegetables are tested for maturity by checking firmness and color. If they are mature, they are picked by hand or mechanically from their growing location.

Reception

- The plant products are hauled by truck to the processing plant.
- At this point, they are inspected visually for any blemishes that may cause an issue with integrity or sanitary issues.

Size & Grading

- Fruits and vegetables are first sorted by size and separated out based upon dimension and firmness.
- After they are sized, they are graded based on appearance and internal quality, which consists of any errors in color, external blemishes, or firmness of the apple.

Washing

- External dirt and chemicals left on the peels are removed through a water bath.
- After this, water spraying and scrubbing may take place for further cleanliness.

Peeling and Coring

- Using a machine, the peel and core can be removed from the plant product or left on depending on product uses. The **core** is the center part of the fruit containing the seeds.
- This can also be done by hand using a paring knife, but is not completed by hand in large processing plants.

Slicing

- Processed plant products can be sliced into even sizes by machine.

Preserving

- The sulfuring process prevents browning of fruits and vegetables. This takes place in a factory using chemicals.
- Coating apple cuts, slices, and dices with a solution of 50% water and 50% lemon juice discourages the browning process.

Drying

- Large dehydrators are set at high temperatures to remove water from the plant products.
- They are then dried to desired crispness. Some products can still be pliable while others can be of potato chip consistency.

Temporary Storage

- Once fruits and vegetables are dried, they are placed in temporary storage for packaging.
- From temporary storage, products will travel down a conveyor into sorting for packaging.

Packaging

- Fruits and vegetables that are preserved are placed in airtight plastic bags for storage and shipment.
- Those that have not been preserved are packaged among soft crate trays or bags to minimize bruising and spoiling.

Shipping

- Fruits and vegetables are then packaged and shipped in crates to destinations based upon variety and local demand.



Name _____

Directions: Answer the questions correctly.

1. Define Core.

2. _____ Washing removes the physical dirt from the outside of the plant product.

- A. True
- B. False

3. List three categories that grading and sorting of plant products is based upon.

- A. _____
- B. _____
- C. _____

4. _____ Inspection of the plant product usually occurs at which step?

- A. Reception
- B. Slicing
- C. Preserving
- D. Harvesting

5. _____ Which process removes the water from the plant product?

- A. Slicing
- B. Drying
- C. Packaging
- D. Preserving