Lesson Number: MS.PS.2.1

Exploring Plants: They Are More than Just Food!

Middle School Food and Agricultural Literacy Curriculum

Precepts

A. Actions

A5. Communicate effectively with others

National Standards

PS.01.03.01.b. Explain requirements necessary for photosynthesis to occur and identify the products and byproducts of photosynthesis.

CS.01.01.01.a. Work productively with a group or independently.

NL-ENG.K-12.4 – Communication Skills

NL-ENG.K-12.12 – Applying Language Skills

NS.5-8.6 – Science in Personal and Social Perspectives

Student Learning Objectives

As a result of this **unit** the students will…

Recognize the importance of plant uses and consumer product awareness.

As a result of this **lesson** the students will …

Identify plant uses and byproducts.

Content Outline

Objective 1. Identify plant uses and byproducts.

I. Plant uses and byproducts.

A. Human food products:

1. The most common plant products are those that are found in the grocery store and supermarkets. Foods such as tomatoes, lettuce, corn, lima beans, and other common fruits and vegetables are all plant products. Vegetables are any edible part of the plant that is not the fruit. This includes foods that are leaves, roots, stems, flowers, and seeds.

   Technically, fruits that we consume (apples and oranges, for example) are the fruiting body of the plant. Fruits are formed from the fertilized ovule (seeds) and the ovary walls of the female part of the flower. The fruit protects the seed and assists in the dispersal of seeds (by attracting animals that may consume the fruit and disperse the seed).

B. Animal food products:

1. Plants are also commonly used to feed animals. Both companion (dogs, cats, and guinea pigs, for example) and livestock animals (dairy cows, beef cattle, swine, and poultry, for example) are often fed feed that contains corn, vegetable oil, cotton seed, hay, and other forages and grains.

Time

Instruction time for this lesson: 45 minutes.

Resources

American Peanut Council. (2009) About the Peanut Industry. Retrieved July 30, 2009, from American Peanut Council. http://www.peanutsusa.com/USA/Index.cfm — Georgia Cotton Commission. (2009) Cotton Lint and Seed Facts. Retrieved July 29, 2009, from — Georgia Cotton Commission http://www.georgiacottoncommission.org/index.cfm — Idaho Forest Products Commission.(2009) Wood You Believe; We Get so Much From Trees.Retrieved July 25, 2009. From Idaho Forest Products Commission.http://www.idahoforests.org/wood_you.htm — Jacob, James (2009). Ethanol From Sugar. Retrieved July 28, 2009. From United States Department of Agriculture. http://www.rurdev.usda.gov/rbs/pub/sep06/ethanol.htm — Kentucky Corn Growers Association. (2009). Corn Products Guide. Retrieved July 28, 2009. — From Kentucky Corn Growers Association. http://www.kycorn.org/kycgaprojects/newuses/cornproductsguide.htm — National FFA Organization. (2009). LifeKnowledge Online. Retrieved July 9, 2009, from — http://agedlearning.org — National FFA Organization. (2003). LifeKnowledge Precepts and Signs of Success. — Stevens and Associates Inc. (2009) Soy World. Retrieved July 25,2009. From Stevens and Associates Inc. http://www.soyworld.com

Tools, Equipment, and Supplies

Access to computers with Internet – one per group, at least
Overhead projector/transparencies
Candy bar – one for demonstration
MS.PS.2.1.TM.A – one per teacher
MS.PS.2.1.AS.A – one per student
MS.PS.2.1.AS.B – one cut-out card per student
MS.PS.2.1.ASSESS.A – one per student

Key Terms

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

Byproducts

a. Nonfood plant products:

1. While plants are most commonly used for either plant or animal food, there are many products of plants that are used every day. There are many household items that are derived from plants including: shampoos, fragrances, adhesives, art supplies, chemicals, pharmaceuticals, furniture, and building supplies. Many of these are ***byproducts*** of edible plant products and crops.
2. A byproduct is a secondary product created during the creation of the primary product. ***Byproducts*** are usually created unintentionally.

Interest Approach

Before class begins, print out and cut out **MS.PS.2.1.AS.B** so there is one card per group for Objective 2.

Good morning, everyone! Welcome back to class. I am so glad that you could all make it to class and are eager to learn. Today we will be discussing the many uses and products from plants.

Set the context of the lesson with a reflective activity to help students think about all of the plant products they realize that they come in contact with on a daily basis.

But first, please close your eyes and think about your daily routine. You wake up and get a shower, brush your teeth, get dressed, and eat breakfast. Then you head to school, lunch, sports practice, out shopping, and your other daily activities. Think about how many times a day you use products that come from plants. How many times you eat fruits, vegetables, or grains. When else, besides at meals, do you use plant products? Now open your eyes. When I say THINK, everyone will get out a sheet of paper and write down as many plant products that you can think of that you or your family use often. You will have two minutes to complete this activity and the student who names the most will receive a prize. *(A candy bar would be a great idea.)* Let's review before we begin.

When will you begin?

When the teacher says THINK

How many plant products will you write down?

As many as we can think of

How long will you have?

Two minutes.

All right, what can I clarify?

Allow 10-15 seconds for student questions. Then, allow the students to begin the activity.

THINK

During the activity, monitor student activity and behavior. For those students who seem confused or cannot think of ideas on their own, work with them and give the students a few examples to start with. Set a timer or watch the clock and give warnings when one minute is completed (this is half of the allotted time) and when 30 seconds remain. Then, call the students' attention back to the front of the room and discuss their responses.

Great work, everyone! Redirect your attention back to the front of the room and we will discuss your thoughts. We are going to go around the room and each of you will share one or two of the items on your list.

Systematically go around the classroom and allow each student the opportunity to share one or two of their responses. Record these responses on an overhead transparency or white board.

Thank you so much for your input. These were all really great ideas and as you see, our list of plant products in our daily life is already quite long. In today's activities, you will have the opportunity to learn about plant products that you may not commonly think of.

Summary of Content and Teaching Strategies

Objective 1. Identify Plant Uses and Byproducts

Now, spend about five minutes explaining to the class the three main categories of plant products: fruits, vegetables, and grains for human consumption, animal consumption, and household and pharmaceutical products.

Exploring Plants: They Are More than Just Food!

If we look at the list on the board of the plant products you helped come up with as a class, we could group these products into three groups: human food, animal food, and others such as household products and medicines. Let's go through these and group them.

First, the most commonly thought of products from plants are those that we enjoy at breakfast, lunch, and dinner. Foods such as tomatoes, lettuce, corn, lima beans, and other common fruits and vegetables are all plant products. Vegetables are any edible part of the plant that is not the fruit. This includes foods that are leaves, roots, stems, flowers, and seeds. Technically, fruits that we consume (apples and oranges, for example) are the fruiting body of the plant.

Which products on the list are for human consumption?

Call on students to share their thoughts. As the students choose those that are for human consumption, circle these products, such as: fruits, vegetables, cereals, grains, bread, etc.

Besides feeding humans, plants are also commonly used to feed animals. Both companion animals (dogs, cats, and guinea pigs, for example) and livestock animals (dairy cows, beef cattle, swine, and poultry, for example) are often fed feed that contains corn, vegetable oil, cotton seed, hay, and other forages and grains.

Look back at your lists. Did anyone think of plant products that we use commonly to feed animals? If so which ones?

Dog food, cat food, fish food, and livestock feed commonly contain grains and vegetable products.

We commonly think of plant products being used as food for humans and even for animals. But did you know that some of the products you use every day are also made from plants including: shampoos, fragrances, adhesives, art supplies, chemicals, pharmaceuticals, furniture, and building supplies. Many of these are ***byproducts*** of edible plant products and crops.

While I'm passing out our activity sheet, think about the definition of byproduct.

Pass out **MS.PS.2.1.AS.A**

Who will share what a byproduct is?

Allow 10-15 seconds for the students to think about the question before calling on volunteers. Take a few suggestions from the students. Then give them the definition of a byproduct.

Those were all very good ideas. Let's look at the definition, but first, look on your handout at the very bottom where it asks you to define a byproduct. Write this definition in that space. A byproduct is a secondary product created during the creation of the primary product. ***Byproducts*** are usually created unintentionally.

Great! When I say RESEARCH, we are going to have the opportunity to learn more about common products that are made from plants. You will receive a card (from **MS.PS.2.1.AS.B**) with the name of a plant or crop on it. Then, using your handout and the recommended websites (post the websites in the resource section on the board or on a handout for the students), you will research tons of interesting facts about the plant. First, you will write the plant name and research and record the plant's scientific name. Next, research where the plant or crop is grown and how.

This includes information about how it is grown (greenhouse, row crop, or maybe even grown on trees) and where they are most likely grown (state, country, or region). In the next column, you will research and record as many food products as you can find that are made from your assigned plant or crop.

Finally, in the third column, you will research and list common non-edible products and ***byproducts*** created from your assigned plant. You will have 20 minutes to complete this assignment. Afterwards, you will share this information with the class in a one-minute presentation. Let's review.

How long will you have to complete this assignment?

Twenty minutes.

How many non-food products and ***byproducts*** should you list?

As many as possible.

What two names should you list?

The common name and the scientific names.

When will you begin?

Exploring Plants: They Are More than Just Food!

When you say RESEARCH.

Very good! What can I clarify?

Place students in groups of three to five. These groups may be pre-arranged or arranged by having students count off. Allow 10-15 seconds for students to share any questions.

Now that you are in your groups, RESEARCH!

As the students work, monitor their progress. For best results, students should be in groups of three to five. Closely monitor their Internet research activity to make sure they are staying on approved sites and on task. If particular groups are having trouble finding specific information, work with them to help them properly utilize Internet search engines and the recommended resource sites to find the information needed. Give warning alerts when ten minutes have elapsed, when five minutes remain, and when 30 seconds remain. Then calls r the students' attention back to the front of the room and have them begin presenting to the rest of the class in an Eye Witness News e-Moment®.

All right everyone, bring your research and writing to a close; you have one minute to shut off the computers, get to your seat, and sit quietly.

Allow about one minute for the students to get situated and calm.

Now each group has learned a lot about their particular plant, and it is time to share this information with our classmates. Now that we have this information, let's communicate effectively and share what we've learned. In communication how can we be a good listener?

Elicit answers.

Correct, now let's practice those listening skills! When I call upon your group, decide who will be the news reporter and who will be the interviewees. Come to the front of the room and interview your group members until at least one interesting fact from each of the three columns is discussed. Then, as our classmates present, we will be silent, pay very close attention, and record a list of interesting facts we learned on our handout.

What questions are there before we begin?

Allow time for student questions.

Then begin calling the groups up one at a time for them to present. Ensure the rest of the students do not talk or disrupt the group presenting.

Review/Summary

When the students have all completed their Eye Witness News e-Moments, review what the class learned by having each student name one interesting fact they have recorded on their handout.

How exciting! Those were such great news reports and we all learned so much. Now, to review, everyone in the class will share one of the interesting facts they listed on their handout during your classmates' presentations.

Call on each student one at a time to share a thought. This should be a very quick activity that will last about two minutes.

Wow! It seems everyone learned very much today. Thank you for working so diligently. We are out of time for today but I hope everyone has a great day and I look forward to seeing you tomorrow.

Application

Extended classroom activity:

As a homework assignment or extension for the next day, have students rethink their normal daily routine. Then the students will record each time they eat or use something that contains plant products. The students will record these observations on a sheet of paper. In class, you will discuss their findings and reward the student who recorded the most plant products in their daily routine.

FFA activity:

Students who enjoy this lesson may be interested in the floriculture FFA CDE which requires students to have extensive knowledge of plant parts, functions, needs, and uses as well as to be able to identify common floriculture plants. For more information visit: ffa.org.

SAE activity:

This lesson can be used to introduce the many opportunities students have to pursue a Supervised Agricultural Experience Program in plant science. Students who are interested in this lesson may wish to participate in entrepreneurship SAEs in nursery production, crop science, biotechnology, food science, or greenhouse management or in a placement SAE at a local nursery, greenhouse, or lawn care store.

Evaluation

MS.PS.2.1.ASSESS.A

Answers to Evaluation

1. Vegetables are any edible part of the plant that is not the fruit. This includes foods that are leaves, roots, stems, flowers, and seeds. Technically, fruits that we consume (apples and oranges, for example) are the fruiting body of the plant. Fruits are formed from the fertilized ovule (seeds) and the ovary walls of the female part of the flower. The fruit protects the seed and assists in the dispersal of seeds (by attracting animals that may consume the fruit and disperse the seed).
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Name _____

Directions: Answer the following short answer questions with two to three sentences that clearly address the question.

1. **Explain the difference between fruits and vegetables.**

2. **What is a byproduct? Give two examples of plant byproducts.**

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I. Plant uses and byproducts.

A. Human food products:

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   a. Nonfood plant products:

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Plant Products Research Activity

Student Name: _____ **Group Names:** _____

Directions: You will work in small groups to research a particular plant that has been assigned to you. As a group, use the Internet and other sources to discover where the plant is grown, what food products come from the plant (if any), and what nonfood products (byproducts) come from the plant. At the end of class, you will share this information with your classmates.

1. Plant Name: _____ **2. Scientific Name:** _____

Describe where and how the plant is grown.	Name the food products derived from the plant.(Which part of the plant is the food derived from?)	Name several nonfood byproducts derived from the plant. (Describe specifically which parts of the plant are used for the byproducts)

As you listen to your classmates' presentations, list six facts about plant uses and byproducts you did not know until today. (Be specific)

1. _____
2. _____
3. _____
4. _____
5. _____
6. _____

Define Byproducts:

_____

Cotton	Corn
Pine Trees	Soybeans
Peanuts	Sugarcane
Maple Trees	Lemons