

Michigan Farm Bureau Ag in the Classroom – Connections to Michigan Content Standards

5th GRADE LESSON – “Agriculture - Cycling Back to You” **Michigan Farm Bureau Promotion and Education Committee**

This lesson meets the following science content standards for the upper elementary level:

III. Use Scientific Knowledge from the Life Sciences in Real-World Contexts.

Content Standard 2: All students will use classification systems to describe groups of living things; compare and contrast differences in the life cycles of living things; investigate and explain how living things obtain and use energy; and analyze how parts of living things are adapted to carry out specific functions. (Organization of Living Things)

- 2-4: Compare and contrast food, energy, and environmental needs of selected organisms.

Content Standard 5: All students will explain how parts of an ecosystem are related and how they interact; explain how energy is distributed to living things in an ecosystem; investigate and explain how communities of living things change over a period of time; describe how materials cycle through an ecosystem and get reused in the environment; and analyze how humans and the environment interact. (Ecosystems)

- 5-1: Identify familiar organisms as part of a food chain or food web and describe their feeding relationships within the web.
- 5-2: Explain common patterns of interdependence and interrelationships of living things.
- 5-5: Describe positive and negative effects of humans on the environment.

IV. Use Scientific Knowledge from the Physical Sciences in Real-World Contexts.

Content Standard 1: All students will measure and describe things around us; explain what the world around us is made of; identify and describe forms of energy; and explain how electricity and magnetism interact with matter. (Matter and Energy)

- 1-3: Identify properties of materials, which make them useful.

V. Use Scientific Knowledge from the Earth and Space Science in Real-World Contexts.

Content Standard 1: All students will describe the earth’s surface; describe and explain how the earth’s features change over time; and analyze effects of technology on the earth’s surface and resources. (Geosphere)

- 1-5: Describe uses of materials taken from the earth.

“Agriculture - Cycling Back to You”

Fifth Grade Lesson

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Presented by: Michigan Farm Bureau Volunteers

Introductions / Welcome (2-3 Minutes)

Introduce yourself and give an overview of your farm.

What is an Ecosystem? (10 minutes)

Show pictures
of the ecosystem

An ecosystem is made up of interactions between all the living and non-living things in an area. For example, we could have an ecosystem in a forest or a desert or even a farm.

There are some things that are found in all ecosystems. First there are producers. These are all the green plants that photosynthesize.

Raise your hand if you can tell me what that means?

Photosynthesis is a process that takes place only in plants, and uses sunlight (radiant energy) to make food (chemical energy). It is a very important process in all ecosystems – all ecosystems need lots of producers.

Of course, ecosystems have organisms that eat the producers too.

Show definition posters

What are these organisms called?

Herbivores or plant eaters – Herbivores only eat green plants.

Then we have organisms that eat herbivores.

What are these organisms called?

Carnivores or meat-eaters.

There are also some organisms, like people, who eat both plants and animals.

What are these organisms called?

Omnivores.

Another important part of all ecosystems are the decomposers. These organisms break down plants and animals that have died and they become part of the soil.

Did you know....a single handful of soil contains more microorganisms than the number of people on Earth....

...An acre of rich grassland soil is home to as many as one million earthworms...

Knowing these facts helps us understand that each part of the ecosystem is important because they depend on each other. If one part is missing, the other parts can't work. We call the interactions of the living things in an ecosystem a **food web**.

**Food Web Activity
(10 minutes)**

Pass out the cards making sure each student in a group gets a different organism.

Pass out the lab sheet #1

Show pictures of the ecosystems

What would happen without producers in a food web? *Because there is so much dependence on one another in a food web, when one part is missing it affects each of the other parts.*

For our first activity, we are going to make our own food webs.

Each of you is getting a card with a plant, animal, or decomposer on it.

(Once everyone has a card)

Each of you will find the other parts of your food web. Once you have found them you should sit down as a group.

Now fill in your worksheet with the names of your producer, herbivore, carnivore and decomposer. If you have more than one, then write down both. Then try to figure out what ecosystem your food web might be found in.

(Have each group report to the class)

Carbon Cycle
15 minutes

Pass out the diagram of the
Carbon cycle.

Put arrows on laminated diagram

In order for these food webs to be part of an ecosystem, we must include some non-living components.

***Can you think of some non-living or abiotic things that affect the organism that you were?
(Sun, water, temperature, soil)***

One of the most important parts of every ecosystem is found in both living and once living things – it is called CARBON.

***Can you tell me where I can find carbon in your ecosystem?
(Carbon dioxide, monoxide, others)***

It is hard to tell because carbon is not always easy to see like a plant or animal. Carbon is in the air, the soil and in all living things.

Let's look at this diagram of the carbon cycle and see where it goes.
(Review the cycle)

As you can see, plants play a really important role in the carbon cycle. Everything else in the cycle gives off carbon; only plants can convert it to oxygen for us to breathe.

Write the ethanol and soydiesel on the board.

Why is this important?

That is why it is important that we preserve farmland and forests where lots of plants grow.

It is also important that we make choices about how much carbon we release into the atmosphere. When we burn fossil fuels like coal and oil – we release a lot of carbon into the air in the form of pollution. Unfortunately, we can not just stop using things that release carbon because we like to drive cars and run factories to provide what we need. We can, however, turn to agriculture to provide alternatives to fossil fuels.

Some alternative fuels that can be used in place of fossil fuels are:

- *Ethanol – made from corn and an alternative to gasoline.*
- *Soydiesel - made from soybeans and an alternative to diesel fuel.*

What are the differences between using these ag products and other products?

What are Ag-based products?

Living plants and animals and their by-products.

What are Non-Ag-Based products?

Any additional materials such as rocks, minerals and petroleum.

Why would we choose one over the other?

Show corn / soybean by-product posters and examples from the kit
(open only a few windows on each poster)

Ag-based products such as ethanol and soy-diesel are safer for the environment and do not require mining like coal. Other ag-based by-products include; ethanol, soydiesel, animal waste, soy-crayons, soy-tile and plastics.

Making Ag-based Product 10 minutes

Pass out the zip-loc bag with cornstarch
(Place a tablespoon of cornstarch in each zip-loc bag)

Let's make our own ag-based product

Add two drops of corn oil to the cornstarch.

Add a tablespoon of water to the corn oil and cornstarch.

Knead the mixture

Add two drops of food coloring to the mixture and knead.

How did the oil and water change the cornstarch?

Describe the material?

Show poster and products
To review the lesson.

**Conclusion
(5 minutes)**

Now that you have created the product, how will we use it?

(as a toy, to hold dentures, etc.)

Making this product is similar to being an agricultural scientist who develops new products and uses.

Let's review what we have learned:

Agriculture plays a big role in the ecosystem.

We have seen how different ecosystems interact through food webs and cycles.

We see the important role the carbon cycle plays and we have seen the benefits of ag verses non-ag based products.

We have also had the opportunity to create our own ag-based product.

Agriculture is a positive part of the ecosystem and choosing ag based products is a positive choice you can make for the environment.

Grass

**I am often eaten
by caribou**

Caribou

I eat grass

Arctic Fox

I eat caribou

Mold

**I breakdown
caribou and fox**

Maple Tree

**My seeds are often
eaten by sparrows**

Sparrow

I eat seeds

Grubs

**I breakdown raccoon,
sparrows and maple trees**

Raccoon

I eat sparrow eggs

Acorn

**I am often eaten
by squirrels**

Squirrel

I eat acorns

Bacteria

**I breakdown squirrels, owls
and acorns**

Owl

I eat squirrels

Cactus

**I am often eaten
by jack rabbits**

Jack Rabbits

I eat cactus

Bacteria

**I breakdown rabbits,
and cactus**

Vulture

I eat jack rabbits

Yucca Plant

**I am usually eaten
by jackrabbits**

Jack Rabbits

I eat yucca plants

Bacteria

**I breakdown rabbits,
yucca plants and vultures**

Vulture

I eat jack rabbits

Corn

I am often eaten
by cows

Human

I eat cows

Bacteria

I breakdown cow
waste and corn

Cow

I eat corn

Alfalfa

I am often eaten
by sheep

Coyote

I eat sheep

Earth Worm

I breakdown sheep,
coyote and alfalfa residue

Sheep

I eat alfalfa

Cactus

I am often eaten
by jack rabbits

Jack Rabbits

I eat cactus

Bacteria

I breakdown coyotes,
Jack rabbits and cactus

Coyote

I eat jack rabbits

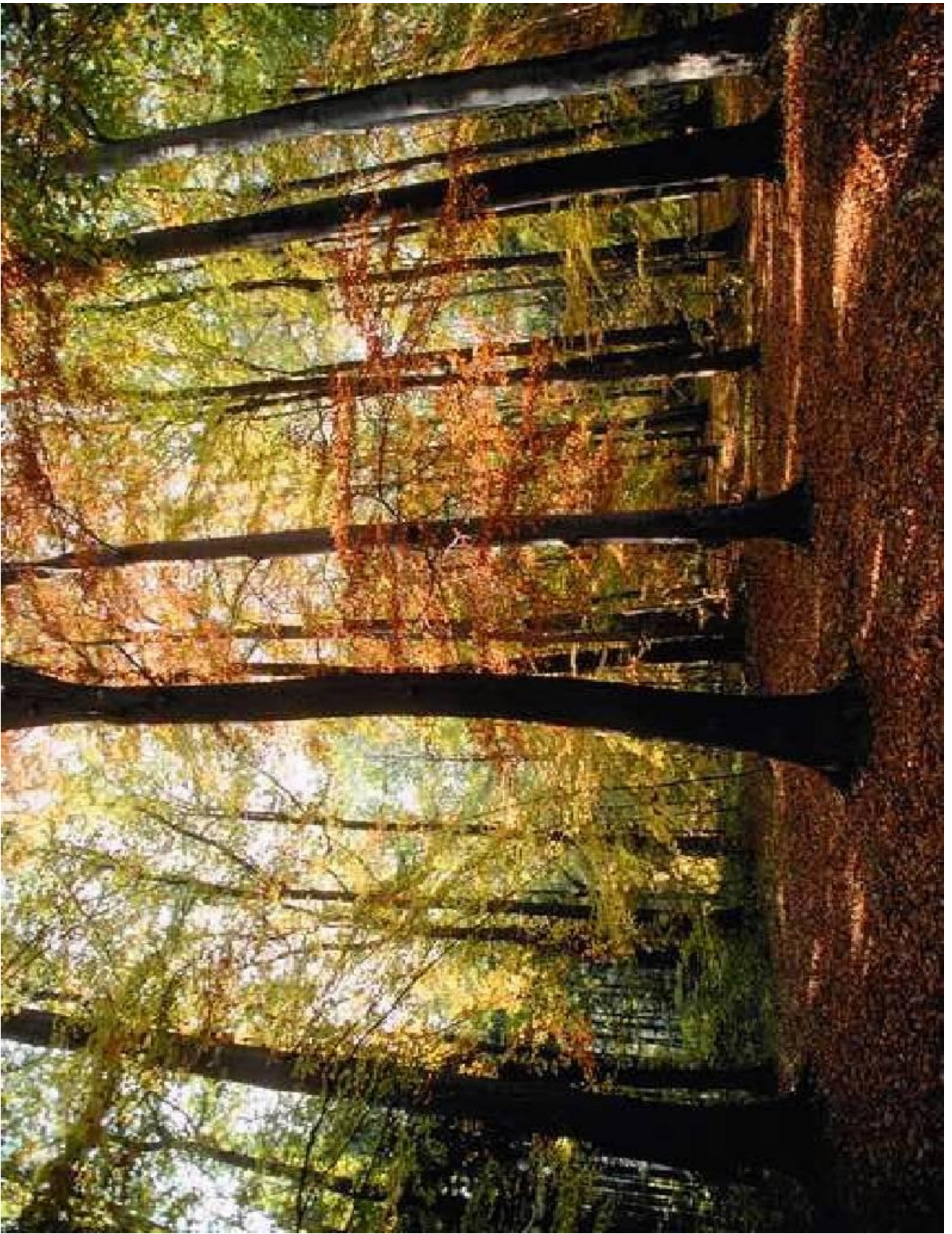
“Agriculture - Cycling Back to You”

Material list

- 1 Picture of each ecosystem
 - Forest
 - Farm
 - Desert
- 1 Large Laminated Ecosystem Definition poster
- 1 Large Laminated Food Web Poster
- 1 Large Laminated Carbon Cycle Poster
- 70 Copies of Lab Sheet # 1 – Food Web Diagram
- 70 Copies of Lab Sheet # 2 - Carbon Cycle Poster
- 1 Dry Erase Marker
- 1 Jug with water
- 1 One cup measuring cup
- 70 Snack size zip-loc bags
- 1 Tablespoon
- 2 Eye droppers
- 2 Boxes of corn starch
- 1 Bottle of corn oil
- 8 sets Ecosystem/Food Web Cards
(4 each)
- 1 Corn products poster
- 1 Soybean products poster
- 2 Bottles of food coloring

Several examples of by-products including:

- Soy-crayons
- Corn peanuts
- Soy – tile



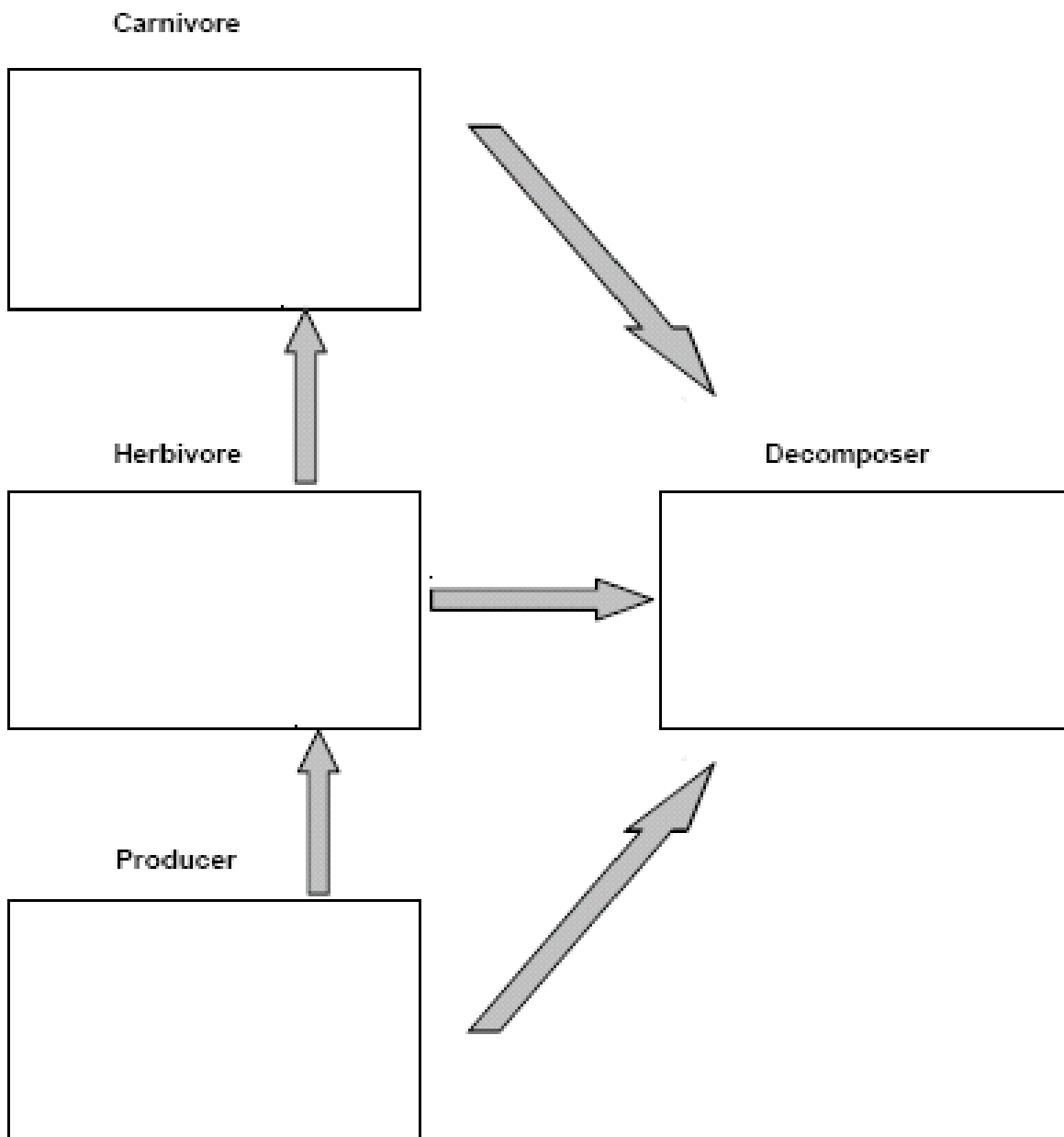




Name _____

Lab Sheet #1

Type of Ecosystem _____



Abiotic Factors

1. _____
2. _____
3. _____

What is an Ecosystem?

An Ecosystem is made up of interactions between all living things and non-living things in an area. (an area as large as the planet or as small as a clump of soil)



*These are some things
found in all ecosystems*



Producer – A producer is all the green plants that photosynthesize.

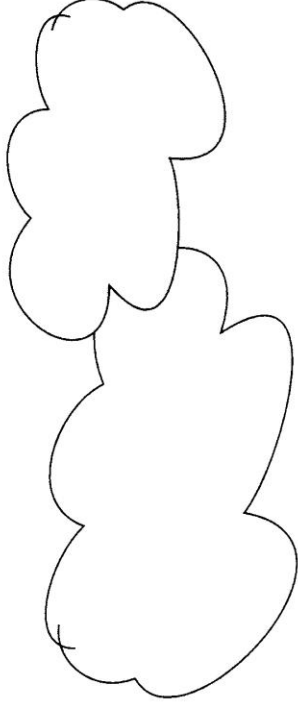
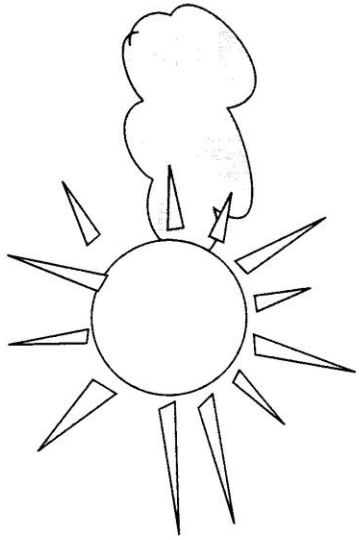


Decomposer - A decomposer is an organism that breaks down plants and animals.

Carbon cycle

Lab Sheet #2

Name _____

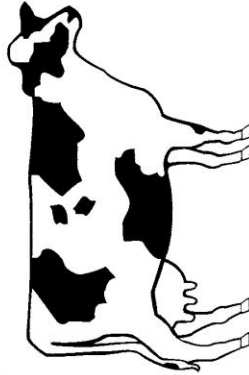


Photosynthesis



Oxygen

Eaten by



Releases CO₂

Decomposers

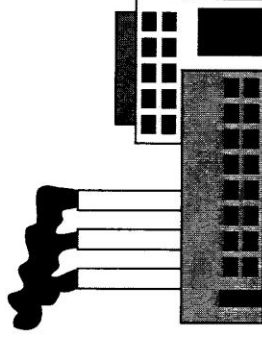
Decomposers

Releases CO₂



Releases CO₂

Burning



↑ Mine to use as a fuel source ↑



Fossil Fuels

Name _____

Lab Sheet
#2 Key

carbon cycle

