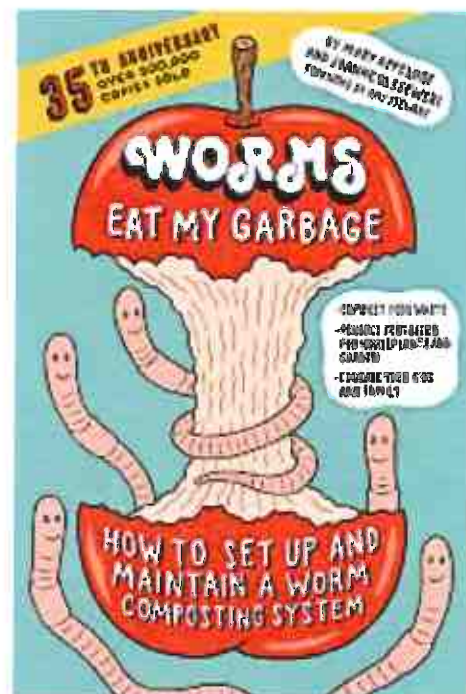
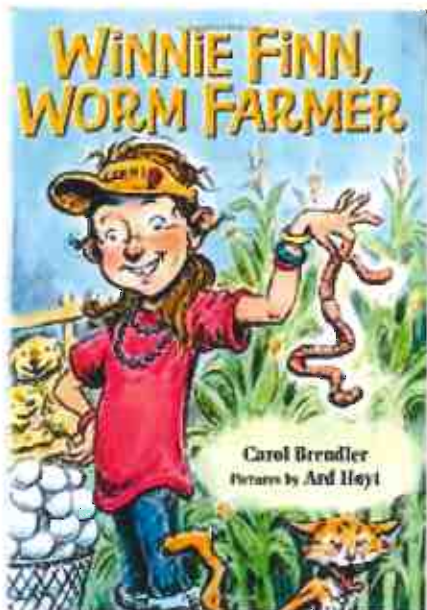


Fascinating Farmers

PSS Kit Number 6

Kit Contains

Root Vue Farm
3 Pieces Utensil Set
"Winnie Finn, Worm Farmer"
"Worms Eat My Garbage How
to Set Up and Maintain a
Worm Composting System"
Lesson Plans



Pint Size Science

Fascinating Farmers



Introduction

Earthworms have been called nature's gardener. They are important to the health of soil in which plants grow.

Farmers need to **plow** the soil before planting, which breaks up the soil and allows air and water to get to seeds and the **roots** of plants. Earthworms act like tiny plows. As earthworms move through the soil, they make tunnels. Just like plowing, these tunnels allow air and water to get to the **roots** of plants. Without access to air and water, plants would not grow well, which is why you might notice that plants sometimes don't survive if the soil they're in is too dry and **compacted**.

Just about all soil has earthworms. The better the soil, the more earthworms you'll find. As earthworms live their lives in the soil, they eat **organic** matter, such as dead leaves, grass clippings, and even dirt. After they **digest** their meal, earthworms produce excrement that helps enrich the soil further. *Their waste helps gardens grow because it's rich in **phosphorus, calcium, nitrogen, and magnesium**. These are all important nutrients that help plants grow and stay healthy.*

Kit Materials

"Winnie Finn Worm Farmer"

Worm ranch kit

Root vue kit

"Worms Eat My Garbage"

Plastic utensils for digging

PLANTS HAVE NEEDS IN ORDER TO GROW

Provocation

Look at materials in the Root Vue Farm kit. What are each of these things? What role do they play in the "farm"?

Investigation

Assemble the "farm" and collect data on growth including moisture, length of root, when shoot breaks the soil surface and harvest date.

*The health of Iowa's soil is dependent on nutrient recycling in order to maintain crops.

NUTRIENTS ARE CYCLED IN ORDER TO SUSTAIN LIFE

Phenomenon

Observe the worm farm. What are the worms eating? How is this similar or different to what you eat?

Investigation

Maintain the worm farm by adding food scraps and other waste products. What things do the worms like to eat? How long does it take to be broken down? What do the food scraps become?

PINT SIZE SCIENCE

FASCINATING FARMERS

ENVIRONMENTAL HEALTH AFFECTS HUMAN HEALTH

Provocation

What happens to the worms if the soil is too wet or too dry? What if they don't get enough food or too much?

Investigation

Maintain the health of the worm farm by monitoring their environmental conditions. How is this similar to our environmental conditions? How can this be used in conjunction with the root "farm"?

FARMERS USE TOOLS TO PLANT, MAINTAIN AND HARVEST CROPS

Provocation

Observe the tools that are used on a farm. What are they each for?

Investigation

Compare these tools to tools that might be used in a garden or by a farmer. How are tools useful to you? To a farmer? Design/create a new or improve a current tool.

Pint Size Science Fascinating Farmers



Main Concepts

- Plants have needs in order to grow
- Nutrients are recycled in order to sustain life
- Environmental health affects human health
- Farmers use tools to plant, maintain and harvest crops

Science standards: IELS-8.1.PS.5, 8.1.PS.7, 8.2.PS.2, 8.2.PS.4, 8.3.PS.1, 8.3.PS.2;

Iowa Core-K-LS1-1, K-ESS2-2, K-ESS3-1, 2-LS4-1



Guiding Questions

How does composting enrich the soil and habitat of plants and animals that depend on it?

What do plants need in order to grow?

Why do farmers cycle their crops? What tools do they use to do their jobs?



STEM Career Connection

Agricultural engineering - Someone who helps to make farming sustainable, safe, and environmentally friendly.

Food Sciences - Person that works with safety, research and product development before food hits the shelves.

Fascinating Farmers

Vocabulary

Photosynthesis: a chemical process in which plants turn water and carbon dioxide into sugar.

Compost: decayed organic material used as a plant fertilizer.

Vermicompost: the product of the composting process using various species of worms, usually red wigglers, to create a mixture of decomposing vegetable or food waste, bedding materials, and vermicast.

Vermicast: the end-product of the breakdown of organic matter by worms.



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Will It or Won't It Grow?



Materials needed

- ✓ Large paper and markers or blank Venn diagram from resource page
- ✓ Root vue farm kit

- Create a Venn diagram and have children name what they think plants need to grow on one side and what people need to grow on the other. **Do people require some of the same things plants need to grow? What don't plants need what people do?**
- Follow the directions of the Root Vue Farm to begin growing the three different types of plants: onions, radishes and carrots. **How will you meet the needs of the plants for them to grow?** Have students record observations of plant growth over time. Select different plant traits to track over time; order of plant structure emergence, stem height, root length, leaf count, for example, would be trackable traits. Share with the class what the findings were.



Seedlings Versus Sprouts



For this activity, **Sprouts** should be able to name a few things that people need, but might have some difficulty with plants. Increase their ability to make connections by pairing the things they name with similar needs of plants. Have them fully participate in planting the seeds in the root vue farm kit. **Seedlings** should be able to investigate, observe, and record their data for the trait they choose to study and communicate their findings to others.



Fascinating Farmers

Will It or Won't It Grow?

Background Information

Plants have basic needs to grow. For examples, they need sunlight, moisture, nutrients, carbon dioxide and oxygen. Different parts of the plant work to acquire these needs. Stems and leaves are like big solar panels for collecting sunlight. Sunlight is important to plants because it provides the energy necessary to drive photosynthesis, which produces sugar. The roots of a plant grow down in the soil in order to collect moisture and nutrients. Water is needed for photosynthesis and nutrients help plants carry out biological functions. Both carbon dioxide and oxygen are required for plants to produce sugar and then burn it for energy. Leaves have special openings on their underside that exchange air with the environment. Plants produce much more oxygen than they need. This excess is released into the atmosphere, which is beneficial for all animals in that environment.

Icon Key



Large or small group



Outside activity



Center activity



Lab coat needed



Teacher supervision required



Safety goggles



Science Sprouts kit

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Worm Farming



Materials needed

- ✓ Winnie Finn Worm Farmer
- ✓ Worm farm
- ✓ Digital microscope
- ✓ Worms Eat My Garbage

- Read *Winnie Finn Worm Farmer*. Can you tell me the steps Winnie took to make the best habitat for the worms to live in? What cycle did she create with her worm farm? Why did Winnie add chicken manure, coffee grounds, newspaper and eggshells to the soil? Discuss what composting is and connect it to the cycle of events in the book.
- Read *Worms Eat My Garbage*. Have children explain why the garbage helps the soil which, in turn, helps us grow our food. {As the earthworms eat the organic material, they will produce waste that is rich in phosphorus, calcium, nitrogen, and magnesium. These are all important nutrients that help plants grow and stay healthy. The soil they live in make it perfect for growing seeds and plants}.
- Set up the worm farm according to the directions. Maintain the worm farm by adding scraps of food and other waste products periodically. What are foods that the worms like to eat? What are some foods that they don't like to eat? Observe it regularly to see what happens to the items.



Fascinating Farmers Worm Farming

Background Information

Red Wiggler worms are excellent worms for composting. They can eat their weight in food scraps everyday! The resulting organic material is rich in the nutrients that other organisms need to survive. There are some basic things to keep in mind when setting up your worm farm. You will need a bin or large container to house your worms. Make sure air is able to flow in and out of the bin. Add bedding material which can come from an existing farm or started with newspaper strips. Add water to moisten the bedding materials. If your bin starts to smell there could be too much water or food scraps. Drain any excess water and bury food scraps one inch below the surface of the bedding material. Most types of food scraps can be used. Avoid things like meat and cheese which can be difficult for the worms and other microorganisms in the bin to break down. Small amounts of citrus, like orange peels, can be added as well.

Icon Key



Large or small group



Outside activity



Center activity



Lab coat needed



Teacher supervision required



Safety goggles



Science Sprouts kit

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Healthy Habitats for All



Materials needed

- ✓ Worm farm
- ✓ Winnie Finn Worm Farmer
- ✓ Root vue container
- ✓ Food scraps with seeds or seed packets

- Revisit *Winnie Finn*. Discuss with the children how the soil from Winnie's worm farm helped the corn grow bigger and better, how the improved corn helped the chickens produce more eggs and how adding the eggs to the puppies' food improved the texture of their fur. Highlight how it all started with the rich soil Winnie made for the worms to live in by adding organic material.
- Use some of the soil from the worms bin to plant some seeds. If fruits or vegetable scraps are added to the worm farm, save some of the seeds and use them to start new plants. Soil from the worm farm can be used as the growing medium. You can grow them in the Root View container or disposable cups. **How will the healthy, rich soil from the worm farm help the seeds grow? If our seeds become plants and the plants produce vegetables (or fruits), how would you explain to someone the cycle we created and why it's important?**
- Care for the seeds in the root vue container by providing sun, water, and air. Observe it periodically to look for sprouts and roots.



Seedlings Versus Sprouts



Seedlings can devise a way to share this information with others, similar to what Winnie did. They could create a poster that explains the importance of composting. They could make a commercial or play to promote the practice of composting or vermiculture. As the worm farm grows, they could share starter sets of compost with other classes or groups.



Fascinating Farmers Healthy Habitats for All

Background Information

Composting is a natural way to recycle organic waste materials such as food scraps, yard waste and used paper products. Bacteria and/or worms decompose the organic material and turn it into a nutrient rich medium that can be used for growing plants and crops. With vermiculture composting, worms are capable of eating between half to their full weight in waste each day. The worm castings are a natural fertilizer and are extremely valuable to the texture and fertility of the soil. These castings can add 10 times the nutrients back into the soil. Vermicompost increases the water-holding capacity of the soil and improves the overall soil structure. Plants will grow stronger and have deeper root systems for better drought tolerance and disease resistance. Humans have composted for years out of necessity and more recently out of responsibility to the Earth and its natural resources.

Icon Key



Large or small group



Outside activity



Center activity



Lab coat needed



Teacher supervision required



Safety goggles



Science Sprouts kit

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What Tools Do the Job?



Materials needed

- ✓ Library books
- ✓ Winnie Finn Worm Farmer
- ✓ Plastic utensils for digging
- ✓ Pencils
- ✓ Paper
- ✓ Guest speaker

- Have children look through library books about farming and the tools farmers use. Look through *Winnie Finn* for any tools she used in her worm farm. Have children record questions they want to ask a farmer about his job and the tools he needs to do it.
- Ask a farmer to come in to talk to the students and have them ask their questions about farming and farming tools.
- **What can you do with tools? How can you explain to someone else how tools help people do their work?** Consider a job that might not have a tool to do it or a tool that can be made better.
- Have the students design and create a tool to make a job easier. **What does your tool do? What job can your tool improve? How does it make the job easier?**



Seedlings Versus Sprouts



Seedling level students will be able to design and create a tool and explain their thinking on its use. Sprout student could use tools in a sandbox to experience how a tool like a cup helps them fill a bucket faster or how a spoon makes a hole faster.

Icon Key



Large or small group



Outside activity



Center activity



Lab coat needed



Teacher supervision required



Safety goggles



Science Sprouts kit



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