NEBRASKA AGRICULTURE IN THE CLASSROOM
NEBRASKA FARM BUREAU FOUNDATION

Literature Guide

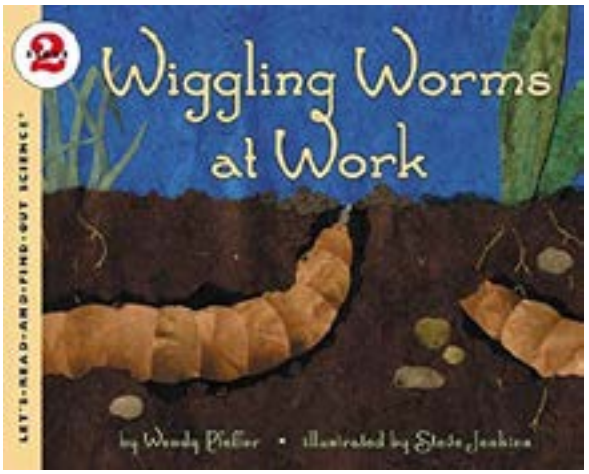
Wiggling Worms at Work

By: Wendy Pfeffer

Activity Level: Intermediate

PURPOSE

Students will interact with the story through discussion questions and writing activities focused on informational text and research.



NEBRASKA STATE STANDARDS CONNECTION

LA.3.RI.2/LA.4.RI.2
Explain the relationship between individuals, historical events, scientific ideas or concepts, or steps in a process.

LA.3.V.2/LA.4.V.2
Interpret an author's use of figurative, connotative, and technical language in grade-level literary and informational text.

LA.3.W.6/LA.4.W.6
Locate evidence from literary and/or informational text sources to answer questions about a topic.

LA.3.SL.2/LA.4.SL.2
Report on a topic or text, tell a story, or recount an experience with appropriate facts and relevant, descriptive details.

WHAT'S THE CONNECTION TO AGRICULTURE?

Worms help improve soil structure and soil chemical and biological properties. They are especially helpful in no-till farming, helping to stimulate air and water movement in the soil. Earthworms tend to thrive most without tillage, if sufficient crop residue is left on the soil surface.

MATERIALS

- Book, *Wiggling Worms at Work* by Wendy Pfeffer
- Access to internet and AV technology
- Anchor chart – Informational—Research/Report
  - Using My Own Words
  - Writing Sketch
  - Facts vs. Opinions

VOCABULARY

Bacteria – a member of a large group of unicellular microorganisms which have cell walls but lack organelles and an organized nucleus

Burrow – a hole or tunnel dug by a small animal or insect

Cocoon – a silky case/something that envelops or surrounds, especially in a protective or comforting way

Crop – an organ where food is stored or prepared for digestion. Typically found in birds, insects, and earthworms

Decay(ing) – rot or decompose through the action of bacteria and fungi

Digest – break down (food) into substances that can be absorbed by the body

Fertilize – cause (an egg, female animal, or plant) to develop a new individual by introducing male reproductive material

Fungi – any of a group of spore-producing organisms feeding on organic matter, including molds, yeast, mushrooms, and toadstools

Gizzard – a muscular stomach of some fish, insects, mollusks, and other invertebrates. A part of the stomach where food is mixed and churned

Mold – a furry growth of minute fungal hyphae occurring typically in moist warm conditions

Plow – to open, break up, or work the earth/area of land

Soil – the upper layer of earth in which plants grow a material typically consisting of a mixture of organic remains

Tunnel – an underground passage dug by a burrowing animal

Wormlet – a small worm

BACKGROUND AGRICULTURAL INFORMATION

As the world population continues to grow, it is important for everyone to be aware of the natural resources that are available and helping farmers grow nutritious food with less space. Knowing how to ensure that each ecosystem is thriving makes us all informed consumers. Worms are a resource deep under the ground that help to aerate the soil, allow space for roots and water, and breakdown rotting materials. This provides nutrients to the plants that are growing in the ground where the worms are working! The worms break down the rotting and decaying materials and leaves, turning the waste into worm castings, which become fertilizer and nutrients for growing plants.

INTEREST APPROACH

- Watch the video "Worms are Wonderful" found at this link: ***https://www.youtube.com/watch?v=l-zc_1vjLnI***. In the event that the link is broken, the video can be found on YouTube with this information:
  Title: Worms are Wonderful
  Channel: SciShow Kids
  Published: Aug 31, 2015
- Provide students a copy of the writing chart "Facts & Opinions" to capture the different facts and opinions shared during the video. Review the students' findings as a class after watching the video.

PROCEDURE

Read the book, *Wiggling Worms at Work,* aloud.

1. Ask students to add to their writing chart "Facts & Opinions" while reading the story. Capture at least five facts and five opinions. Review the facts students captured after completing the story. Then, choose some or all literal comprehension questions from the list below for discussion:
   - Where do the worms work?

- What other items are in the ground that the worms are working around?
- What do worms eat?
- Why do farmers plow their fields?
- Why are the worm tunnels beneficial to the plants?
- How do worms tunnel through hard soil?
- Where does the soil go after it enters the worm's mouth?
- Without teeth, how do worms digest the soil?
- What are the pellets of digested plant bits called?
- How do worm castings help plants?
- What do worms take into the ground with them?
- How do the dead leaves and plants help the soil?
- Why can worms twist and turn so easily?
- What are worms' soft bodies made up of?
- How do worms move without legs?
- How can a worm know where it is going?
- Discuss the body parts that a worm does/does not have.
- How do worms breathe?
- What happens when worms are left in the hot sun?
- Why do worms crawl to the surface?
- Discuss why you think worms pick leaves with pointed ends.
- Where do worms eat?
- Why is it important for the worm to cover the hole of its burrow?
- Where do worms mate?
- What do worms do after they mate?
- How do worms lay their eggs?
- What happens to the eggs that are in a cocoon?
- How long does it take for the worm eggs to hatch?
- Describe what the baby worms look like.
- How do worms prepare for winter?
- What is the result on vegetables, flowers, trees, and grass due to the worms' work?

2. Informational Writing activity
   - Ask students to write an informational report about one of the following topics: the benefit of worms to the soil, a worm's lifespan, or a worm's habitat.
     - Instruct students to utilize the information that they gathered on the "Facts & Opinions" writing chart as a basis of their report.
     - Students should utilize the "My Own Words" writing tool while researching the topic of their choice.
     - Refer the students to the informational writing anchor chart, "Writing Sketch" to capture and organize their thoughts.

- Encourage students to use vocabulary words they learned in the story and to utilize appropriate web-based research to learn about different kinds of worms, their life span, etc.
- Challenge students to create a poster or slide presentation about their research.
- Provide students the opportunity to share their presentation with the class.

FOLLOW-UP QUESTIONS

Choose some or all the follow-up questions below to lead a discussion with the class.

- How does crumbly, loose, soil help plants?
  - *Loose soil allows the roots of plants to spread out and grow.*
- How do the worm tunnels benefit the plants?
  - *Tunnels allow roots of plants to access rainwater and air, helping them grow better.*
- What kind of leaves and plants do the worms eat?
  - *Dead/rotting leaves and plants.*
- Discuss how the worm moves using the bristles under each segment of their body.
  - *The bristles act like legs. Strong muscles allow the worm to stretch out, then the bristles fasten to the soil and the back of the worm slinks up.*
- How do worms protect themselves from predators, like birds?
  - *Hiding in their burrow is the only way worms protect themselves from enemies.*
- What kind of soil must worms live in?
  - *Worms live in moist soil.*
- Why do worms need moist soil?
  - *They breathe through their skin, and the skin must stay moist for air to move through.*
- What do dead and decaying plants have that live plants do not?
  - *Bacteria.*
- Describe how worms eat fungi and mold.
  - *They slurp the hairlike strands—similar to how you eat spaghetti!*
- What is the pile of castings over the burrow called?
  - *Midden.*
- How are worms different than most animals regarding their reproduction system?
  - *Each worm is both male and female—but they still need a mate to reproduce.*
- How long do the worm eggs spend in the cocoon?
  - *About three weeks.*
- How many eggs typically hatch from the cocoon?
  - *Only three or four wormlets emerge out of the 30+ eggs in the cocoon.*
- Share our opinion: How can we protect worms so that they can keep doing their job?
  - *Answers will vary and may include moving worms back to dirt areas when we find them on the sidewalk, build a compost pile to provide additional food for worms, etc.*

EXTENSION ACTIVITIES

Explore the suggested activities at the back of the book!

Lesson Plan: ***Color in the Garden***
Students use the art of soil painting to explore science and the natural world while learning about the color wheel, the importance of soil to agriculture, and why soils have different colors.

Lesson Plan: ***Working Worms***
Students observe how earthworms speed the decomposition of organic matter and identify how this adds nutrients to the soil that are important for plant growth by constructing worm habitats from milk jugs.

Video: ***Worm Farm***
This four-minute video tells the story of Kevin, who's been fascinated with garbage since he was little. He wanted to put an end to landfills and make it easier for people to recycle. How? Worms decompose organic waste! Learn how worms can help us with our garbage in this engaging video.

Facts & Opinions

Name: _____

The topic is: _____

Capture at least five facts and five onions from the video and story.

Facts

-
-
-
-
-
-
-

Opinions

-
-
-
-
-
-
-

Using My Own Words

Name: _____

Title of Source: *Wiggly Worms at Work*

Author's words: Find a sentence in the that matches a fact or opinion from your Fact & Opinion notes.

- _____
- _____
- _____
- _____
- _____

My paraphrasing: **Remember the rule of 5—You can choose 5 words from the author's sentence, but not 5 in a row!

- _____
- _____
- _____
- _____
- _____

Writing Sketch

Name: _____

My topic is: _____

Introduction: _____

_____

_____

_____

Paragraph #1: _____

Detail #1: _____

Detail #2: _____

Detail #3: _____

Paragraph #2: _____

Detail #1: _____

Detail #2: _____

Detail #3: _____

Paragraph #3: _____

Detail #1: _____

Detail #2: _____

Detail #3: _____

Conclusion: _____

_____

_____

_____