



STEMsational Ag: The Virtual Farm

MIDDLE TENNESSEE STATE UNIVERSITY



Module 12: Farm Fashion UNIT 1: FANTASTIC FIBERS Grades 6 – 8



National Institute of Food and Agriculture
U.S. DEPARTMENT OF AGRICULTURE



This work is supported by the Agriculture and Food Research Initiative, Education and Workforce Development Program. [grant no. 2021-67037-33380/project accession no. 1024880], from the U.S. Department of Agriculture, National Institute of Food and Agriculture. Any opinions, findings, conclusions, or recommendations expressed in this publication are those of the author(s) and should not be construed to represent any official USDA or U.S. Government determination or policy.

0422-0572 / Middle Tennessee State University does not discriminate against students, employees, or applicants for admission or employment on the basis of race, color, religion, creed, national origin, sex, sexual orientation, gender identity/expression, disability, age, status as a protected veteran, genetic information, or any other legally protected class with respect to all employment, programs, and activities sponsored by MTSU. The Assistant to the President for Institutional Equity and Compliance has been designated to handle inquiries regarding the non-discrimination policies and can be reached at Cope Administration Building 116, 1301 East Main Street, Murfreesboro, TN 37132; Christy.Sigler@mtsu.edu; or 615-898-2185. The MTSU policy on non-discrimination can be found at mtsu.edu/iec.

Materials are intended for educational purposes only. Content Contributors and the STEMsational Ag team have reviewed to ensure all content is cited. Please contact STEMsationalAg@mtsu.edu with any concerns.



Module 12: Farm Fashion
UNIT 1: FANTASTIC FIBERS
Grades 6 – 8



6th – 8th Grade:

Introduction to the Unit:

People have been using plant fibers for thousands of years in order to make clothing, rope, and paper. There are many plants that produce long and relatively strong fibers made of lignin and cellulose. Plant fibers found in the leaves and stems give strength and rigidity to the plant. Other fibers can be found in the fruit and seeds, like cotton. Other fibers come from animals like the wool from sheep, llamas, alpacas, and goats or even the silk from silkworm insects. Fibers can be spun into thread which is then woven into fabric or pressed together for paper.

Pre-assessment - On a piece of paper, write your answers to the questions below:

- 1) What fabrics come from plants and animals? What fabrics are synthetic?
- 2) What are the characteristics of plant and animal fibers compared to synthetic?
- 3) Why is it important to understand the role of fibers in today's world?



Purpose:

To explore different fabrics and understand their characteristics and how this impacts their uses in our daily lives.

Student Learning Outcomes for the Unit:

- ▶ Student will create paper using fibers.
- ▶ Student will explore the characteristics of different types of fibers and fabrics.
- ▶ Student will demonstrate an understanding the role fibers and fabrics have in the world today.
- ▶ Student will identify and articulate the types of fibers and fabrics and their uses.

National Agricultural Literacy Outcomes

Food, Health & Lifestyle, Theme 3

T3.6-8

I. Identify sources of agricultural products that provide food, fuel, clothing, shelter, medical, and other non-food products for their community, state, and/or nation

Vocabulary Words:

- ▶ **Fibers:** materials from nature or man-made that form the foundation for fabric
- ▶ **Natural:** natural fibers that come from plants, animals and insects and are woven into fabric
- ▶ **Synthetic:** man-made fibers that are created from a chemical process
- ▶ **Cotton:** natural fiber that comes from the seed of the cotton plant and known for its breathable, absorbent fabric
- ▶ **Silk:** natural fiber that comes from the cocoon of the silk moth and known for its durability and strength
- ▶ **Nylon:** synthetic fiber that is made from petrochemicals that turns into fabric which is wrinkle resistant and dries quickly
- ▶ **Polyester:** synthetic fiber known for being durable and relatively inexpensive to produce
- ▶ **Rayon:** considered a synthetic fiber but made from purified plant cellulose fibers, typically wood pulp

Materials Needed:

- ▶ Samples of fabric (can be clothes from your closet)
- ▶ 2x4 inch fabric samples of 100% cotton, cotton/polyester blend, 100% nylon (often found in underwear), 100% rayon, 100% silk



-
- ▶ Ruler
 - ▶ A bowl filled with 4 cups of water
 - ▶ Washable ink or food dye
 - ▶ Timer or stopwatch
 - ▶ Scrap Paper, old newspaper, construction paper
 - ▶ Plastic storage tub or vat
 - ▶ Kitchen blender – get one from the thrift store, don't use for edible purposes
 - ▶ Large pan, 18 x 24"
 - ▶ Mould and Deckle (a screen attached to a frame- can be purchased at a hobby shop) or an old window screen
 - ▶ Towels, cloth, or other absorbent material
-

Complete This Activity: Finding Fibers In Your Closet!

- ▶ Go into your closet and try to find samples of cotton, linen, spandex, rayon, polyester, silk, nylon, and wool. Do certain fabrics fall into a category like "sportswear" or "formal dress" or "casual?" Why do you think this is?
 - ▶ Take the different fabrics and observe them. Do they stretch? Do they wrinkle easily? Do they keep you warm or cool? Different fabrics, both natural and synthetic, have different characteristics depending on the use.
 - ▶ Which ones do you think come from natural fibers? Which ones do you think are man-made? Are there any that don't fall into either category?
-

Complete This Activity: Sweaty or Sweet?

When playing or working hard, you don't want to end up as a stinky, sweaty mess. Wicking Fabrics are considered technical fabrics that have been engineered to draw moisture away from the body. In this experiment you will understand which materials can transport water away from your skin to leave you having fun and smelling sweet.

Materials:

- ▶ 2x4 inch fabric samples of 100% cotton, cotton/polyester blend, 100% nylon (often found in underwear), 100% rayon, 100% silk
- ▶ Ruler
- ▶ A bowl filled with 4 cups of water
- ▶ Washable ink or food dye
- ▶ Timer or stopwatch



Directions:

- 1) Add 10 drops of food coloring to the bowl of water.
- 2) Submerge the corner or the end of one fabric into the water.
- 3) Hold the fabric in the water for a minute.
- 4) Record how far up the fabric the liquid traveled on the chart below.
- 5) Repeat with the next fabric and record measurements.
- 6) Make sure all samples are submerged to the same depth.
- 7) Continue until you have measured each fabric.

Sweaty or Sweety?

Activity Handout

Directions: Use the chart below to record your observations during the activity.

Type of Fiber	Centimeters Wicked (How far did the dye travel up the fabric?)
100% Cotton	
Cotton-Polyester Blend	
100% nylon	
100% rayon	
100% silk	

Activity Processing Questions:

- ▶ Which samples wicked the liquid the fastest?
- ▶ Which samples are man-made?
- ▶ Which are natural?
- ▶ Which fibers wicked the liquid the slowest?
- ▶ Which fabrics would you want to take to the mountains or beach? Why?

Complete This Activity: Paper Making

Throughout history, paper has been made from a wide variety of materials like wood pulp, rice, papyrus, cotton, among others. Today’s paper fiber comes mainly from byproducts from the sawmilling process of lumber, pulpwood logs (logs that cannot be milled into timber) and recycled paper products. Most of the paper we use is a blend of new and recycled fiber. These materials are cleaned and soaked and pressed together. Paper is made when plant cellulosic fibers are bonded together.



Materials:

- ▶ Scrap paper, old newspaper, construction paper
- ▶ Plastic storage tub or vat
- ▶ Kitchen blender (get one from the thrift store, don't use for edible purposes)
- ▶ Large pan, 18 by 24 inches
- ▶ Mould and Deckle (A screen attached to a frame. Can be purchased at a hobby shop.) or an old window screen
- ▶ Towels, cloth, or other absorbent material

Directions:

- 1) Cut or rip your paper into about 2 inch squares. The smaller you rip your paper pieces, the finer your paper will be.



- 2) Soak your paper for a few hours or overnight in a tub full of water. Add warm water to increase the speed of the soaking process.





- 3) Pour the soaked paper scraps and water into a blender until it's about two-thirds full. Be sure to add a lot of water for easier blending.



- 4) Run the blender on "slow" and blend for approximately 30 to 40 seconds. Blend to the texture that you prefer. The longer you blend, the finer the paper texture will be.



- 5) Fill a large pan at least one-third of the way full with warm tap water (18 by 24 inches).
- 6) Pour the blended paper mixture into the pan.
- 7) Stir for 10-20 seconds.
- 8) Place the screened frame in the mixture. Lightly shake the frame from side to side until the mixture is even on top of the screen.



- 9) Lift the screen until it is above water and hold over the pan so that excess water can drip.



- Alternatively, take the paper mixture and pour onto a window screen with a pan below to catch the water. Gently spread out the mixture and continue with the steps below. Smooth the mixture across the screen.
- 10) Place a small towel over the frame, press out the excess water, then holding the towel to the paper, flip upside down. Press a towel or paper towels onto the wet paper pulp.



*Press the paper towel gently
onto the paper pulp.
You can add more paper
towel if needed.*



- 11) Lift the screen away from paper and the wet sheet of paper should remain on the towel. The drying time of the paper will depend on how thick the paper is.



- 12) Wait 8-24 hours until the paper is dry.
- 13) Now, you are ready to use the sheet of home-made paper!

Post Assessment

Write a summary of what you learned about fibers. Use the questions below to guide your thinking:

- 1) What fabrics come from plants and animals?
- 2) What fabrics are synthetic?
- 3) Do you think fibers are stronger together or singularly? Why or why not?
- 4) What properties do plants and animal fibers need to have for today's uses?
- 5) What can you do to support sustainable fiber production in your community?