



# STEMsational Ag: The Virtual Farm

MIDDLE TENNESSEE STATE UNIVERSITY



## Module 12: Farm Fashion UNIT 1: FANTASTIC FIBERS Grades 3 – 5



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.

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Module 12: Farm Fashion  
UNIT 1: FANTASTIC FIBERS  
Grades 3 – 5



### 3rd – 5th Grade:

#### Introduction to the Unit:

Natural fibers come from plants and animals and are used for clothing, rope, paper and even building materials. Plant fibers can come from stems, leaves, and seeds and usually contain long and strong materials called cellulose and lignin. Plants that are grown commercially for fiber include cotton, hemp, jute, flax, ramie, and sisal. Other natural fibers come from animals and consist mostly of proteins. Some examples are silkworm silk, wool from sheep, alpacas and llamas, and animal hairs such as cashmere and mohair from special types of goats, and angora from rabbits.

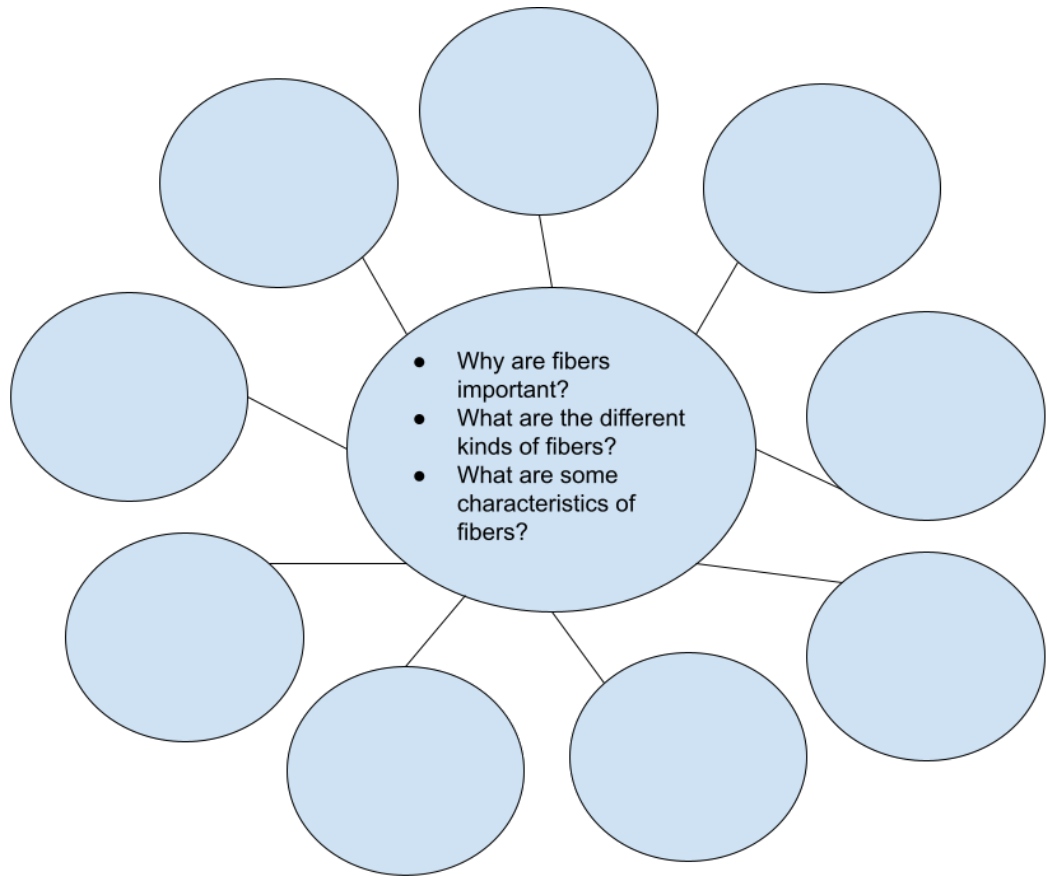
#### Pre-assessment

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

- 1) What are the different types of fibers?
- 2) What characteristics do different fibers have?
- 3) How can we use fibers in our everyday lives?



4) Create a graphic organizer, like the one below, and map out the ideas you have. You can put as much information on there that you can think of.



**Student Learning Outcomes for the Unit:**

- ▶ Student will create cotton thread, extract pineapple fibers and make fiber art.
- ▶ Student will explore different types of fibers.
- ▶ Student will demonstrate an understanding of different fibers and the fabrics they make.
- ▶ Student will identify the role fibers play in their lives.

**National Agricultural Literacy Outcomes**

**Agriculture and Environment, Theme 1**

**T1.3-5**

E. Recognize the natural resources used in agricultural practices to produce food, feed, clothing, landscaping plants, and fuel (e.g., soil, water, air, plants, animals, and minerals)



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### 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
- ▶ **Cellulose:** the main material found in plant cell walls that make up plant fibers
- ▶ **Lignin:** naturally abundant polymer found in plant cell walls that make up plant fibers
- ▶ **Cotton:** natural fiber that comes from the seed of the cotton plant
- ▶ **Piña:** long, delicate fiber that comes from the leaves of a pineapple plant

### Materials Needed:

- ▶ Cotton ball or cotton boll if available
- ▶ Cotton t-shirt or piece of fabric (muslin or cheesecloth work well)
- ▶ Magnifying glass
- ▶ Pineapple leaves
- ▶ Plastic knives
- ▶ Plate or cutting board
- ▶ Piece of sturdy cardboard
- ▶ Scissors
- ▶ String
- ▶ Yarn, and optional, different colored yarn
- ▶ Plastic sewing needle

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## Complete This Activity: Finger Spinning Cotton

### Activity Introduction:

Cotton (*Gossypium hirsutum*) fibers come from the seeds and have a strength and flexibility that lends well to being spun into thread. In the early 1900's, "cotton was king" exceeding the value of all other crops with a record of 1.8 million planted acres. Today, cotton still remains an important crop in the southeast.

Before cotton is made into clothing, it must first be spun into thread. Machines usually do this process, but it is possible to use your fingers to form a rough thread.



**Materials:**

- ▶ Cotton ball or cotton boll if available
- ▶ Cotton t-shirt or piece of fabric (muslin or cheesecloth work well)
- ▶ Magnifying glass

**Directions:**

- 1) Gently spread apart the cotton ball into a large, fluffy cloud. See the images below for examples.



- 2) Keep your cotton cloud in one piece and hold it in your non-writing hand (if you are right-handed, hold the cotton in your left).



- 3) To spin into the thread, take your index finger and thumb of your writing hand and pinch a very small amount of the cotton. Look at the screenshots and read the narration from *Finger Spinning Cotton* for a demonstration.

# Finger Spinning Cotton

Also available online at: [www.youtube.com/watch?v=Xa-Cpv6l3pw](http://www.youtube.com/watch?v=Xa-Cpv6l3pw)

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Fluff a cotton ball.



Gently twist  
the cotton.





Keep twisting.

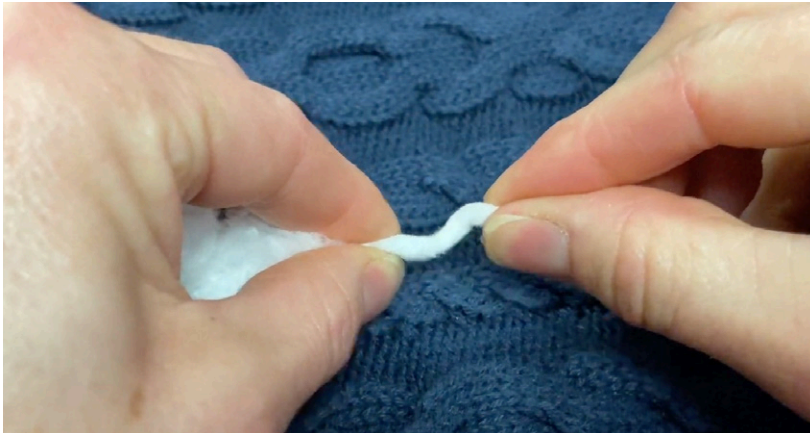






Pull cotton  
and twist.





Once you have a long thread, ...



tug to test the strength.

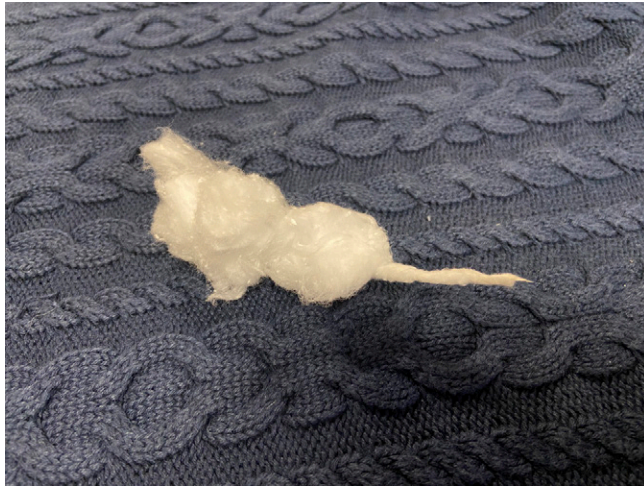
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- 4) While pinching the cotton, twist it gently in one direction.
- 5) Slowly pull more cotton and continue twisting in the same direction. You will see a rough thread start to form. View the image below for an example.



- 6) Don't let go of the twist, keeping it pinched so it will not unwind.
- 7) Let's compare your cotton thread to machine-spun cotton. Using a magnifying glass to find the woven pattern in your fabric. What does it look like?
- 8) Make a cut in your fabric and try to pull out a thread. Use the magnifying glass to take a closer look. Can you find the twist on the thread? What does it look like?

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### **Activity Processing Questions:**

- ▶ How long can you make your cotton thread? How thick is it? How strong is it?
- ▶ What does your cotton thread look like compared to the machine made fabric?
- ▶ Which is stronger, a single thread or woven fabric? Why?
- ▶ What other fabrics can you compare cotton to? Try linen (from flax), wool, or silk. How do animal fibers compare to plant fibers?

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### **Complete This Activity: Pineapple Fiber Extraction**

#### **Activity Introduction:**

There are a number of plants that have strong fibers and when extracted can be used to make clothing, cordage (rope), and paper and other items.



The bast fibers in pineapple (*Ananas comosus*) leaves are used to make delicate piña cloth in parts of southeast Asia. Used primarily in the Philippines, the fibers are extracted from the long pineapple leaves, are cleaned and dried and then hand-knotted into long threads. These threads are then woven into decorative clothing (formal wedding attire), table linens, bags, mats, ropes, twine, paper or other clothing.

### Materials:

- ▶ Pineapple leaves
- ▶ Plastic knives
- ▶ Plate or cutting board

### Directions:

- 1) Have an adult help you remove the top of a pineapple (save the fruit to eat later!). Gently remove a leaf from the top and put it on the cutting board or plate.
- 2) Take a plastic knife (some cultures use coconut shells or broken plates) and grip the top edge of the blade and in your other hand hold onto the leaf.
- 3) Push the blade gently, but firmly across the length of the leaf away from your body.
- 4) Continue pushing across the leaf, removing the leaf pulp until white fibers appear. These white fibers are the pineapple or piña fibers.
- 5) Test the tensile strength by holding each end of the fiber and pulling it tightly.
- 6) You can also root your pineapple top by pulling off the bottom leaves and putting it in a jar of water. Watch the roots emerge and then plant it to grow your own pineapple plant!



Image credit: iStock/Geshas

*It is fun and easy  
to root a pineapple  
in a jar on your windowsill.*



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## Activity Processing Questions:

- ▶ What do the pineapple fibers look like?
- ▶ How long are your fibers? Did you know that pineapple leaves can grow up to 5 feet?
- ▶ When you pulled on your pineapple fibers, did they break? How hard could you pull?
- ▶ Why do you think pineapple fibers are important to some communities?

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## Complete This Activity: Tiny Tapestries

### Activity Introduction:

Fabric is commercially woven from fiber that has been processed into thread. In this project you will create a similar process by making a cardboard loom and weaving a tiny tapestry that can be displayed in your room.

### Materials:

- ▶ Piece of sturdy cardboard
- ▶ Scissors
- ▶ String
- ▶ Yarn and optionally different colored yarn
- ▶ Plastic sewing needle

### Directions:

- 1) To make your loom, cut a piece of cardboard to 5 inches by 7 inches.
- 2) Snip evenly spaced cuts across one end of the loom. You can make as many cuts as you like, but be sure to space them evenly.





- 3) Make identical cuts at the other end of your loom.
- 4) Next, you'll need to make your warp. The warp refers to the yarn that runs lengthwise on a weaving loom while the weft refers to the yarn that you weave horizontally over and under these strings.
- 5) Take some yarn and insert it into one of the first cuts, leaving 4 inch tail. Bring the yarn down the front of the loom to the matching slit at the other side. Bring it back up behind the loom the second slit. Pull it down the front of the loom again, and up the back to the third slit. Continue until you reach the end of the loom.



- 6) Cut your yarn and tape that tail to the back of the loom.



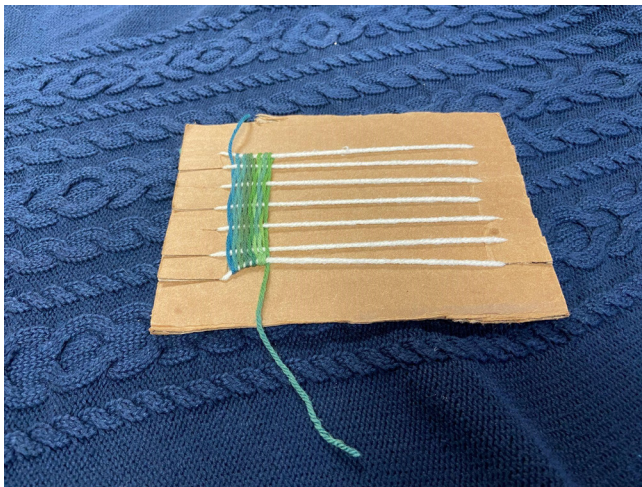
- 7) To begin weaving, thread a 2 foot length of yarn through your sewing needle. Alternatively, just use your fingers to weave.



- 8) Starting at one end of the loom, weave your needle under and over the warp strings on your loom. Continue back and forth across the loom until the yarn runs out. Finish at an edge and leave the tail hanging loosely at that edge.



- 9) When you get to the end of a row, use a plastic fork or your fingers to gently nudge your yarn close to the previous row.
- 10) Continue back and forth across the loom until the yarn runs out. Finish at an edge and leave the tail hanging loosely at that edge.



- 11) Begin where you left off, you can add in different colors of yarn if you like, just leave a tail at the start and the end of your yarn. You will tie the tails together when you finish your project.



- 12) Try not to pull your yarn too tight as you're weaving, or the shape of your project won't be as uniform.
- 13) When you are done weaving, gently remove each of the warp threads from one end and tie pairs together in a double knot and tuck the ends into your tapestry with your needle or leave them loose if you prefer. Repeat for the other end.







- 14) Tidy up all the loose tails at the end of the rows in the same way by double knotting them and tucking them into your tapestry.



- 15) You can attach your weaving to a pencil or dowel by taking a piece of yarn and threading a piece of yarn through your tapestry and tying off a loop onto the pencil or dowel.



## Post Assessment

Go back to your pre-assessment page and reflect.

Based on what you know now:

- 1) What are the different types of fiber?
- 2) How are fibers important in our everyday lives?
- 3) Add any new ideas to your graphic organizer and cross out any ideas that you no longer agree with.