



HOW DO PLANTS BREATHE?



Illinois Extension
UNIVERSITY OF ILLINOIS URBANA-CHAMPAIGN

OBJECTIVES

- LEARN THE BASICS OF TRANSPIRATION AND ITS PART IN THE WATER CYCLE.
- LEARN SCIENTIFIC OBSERVATION SKILLS.

MATERIALS

1 PLASTIC BAG
RUBBER BAND
PLASTIC CUP
MAGNIFYING GLASS
1 SHEET OF CARDSTOCK
COPY PAPER
WATER

GUIDING QUESTIONS

1. HOW DOES WATER MOVE THROUGH THE ENVIRONMENT?
2. HOW DO PLANTS BREATHE?
3. HOW DO SCIENTISTS FIGURE OUT FACTS ABOUT PLANTS?

CONCEPTS

- THE WATER CYCLE IS THE PROCESSES THAT CIRCULATES WATER THROUGH THE EARTH'S OCEANS, ATMOSPHERE AND LAND.
- PLANTS PLAY A PART IN THE WATER CYCLE THROUGH TRANSPIRATION.
- SCIENTIST USE OBSERVATIONS AND EXPERIMENTS TO LEARN ABOUT THE WORLD AROUND US.

FACTS

- WATER MOVES AROUND THE EARTH.
- HUMAN BREATHING IS CALLED RESPIRATION. PLANT "BREATHING" IS CALLED TRANSPIRATION.
- EVERY DROP OF RAIN OR SNOW THAT FALLS FROM THE SKY HAS ALWAYS BEEN HERE AND IS PART OF THE WATER CYCLE.
- TRANSPIRATION COOLS THE PLANT AND THE SURROUNDING AREA. A MATURE OAK TREE HAS THE SAME COOLING POWER AS FOUR AC UNITS.
- WHILE LEAVES DON'T HAVE MOUTHS TO BREATHE, WHAT THEY DO HAVE IS LITTLE HOLES IN THEIR LEAVES CALLED STOMA OR STOMATA THAT ALLOW THE WATER TO EXIT THE LEAVES.
- PLANTS NEED WATER, BUT THEY ONLY USE A SMALL PERCENTAGE OF WHAT THEY TAKE IN. THE REST (0% TO 5%) IS RELEASED DURING TRANSPIRATION.



INTEREST APPROACH-ENGAGEMENT

SOME OPEN ENDED QUESTIONS:

- WHAT WOULD HAPPEN IF YOU WENT UNDER WATER AND LET YOUR BREATH OUT?
- HOW DO YOU THINK PLANTS BREATHE?
- WHAT ARE LEAVES USED FOR?



EXPERIMENT 1: CAPTURING WATER FROM A LIVING LEAF

- TAKE A PLASTIC BAG OUT TO A TREE BRANCH.
- PUT THE PLASTIC BAG OVER THE BRANCH MAKING SURE TO HAVE AT LEAST ONE LEAF IN THE PLASTIC BAG.
- USING A RUBBER BAND, TIE THE PLASTIC BAG TO THE BRANCH AS TIGHTLY AS YOU CAN.
- NOW WAIT A COUPLE OF HOURS AND THEN SEE WHAT HAPPENED.
- REMOVE BAG AND RUBBER BAND FROM THE TREE.

*****NOTE: THE WATER IN THE BAG WILL SMELL AND WE DO NOT RECOMMEND DRINKING IT.**

VARIATIONS ON THIS EXPERIMENT:

- TRY ONE BRANCH IN THE SUN AND ONE IN THE SHADE. IS THERE A DIFFERENCE?
- TRY ONE DURING THE DAY AND ONE AT NIGHT.
- TRY DIFFERENT TYPES OF PLANTS. IS THERE A DIFFERENCE IN THE AMOUNT OF WATER?

ACTIVITY: MAKE YOUR SCIENCE JOURNAL

- TAKE A PIECE OF CARDSTOCK AND FOLD IT "HAMBURGER" STYLE OR WIDTH-WISE.
- FOLD SEVERAL PIECES OF COPY PAPER THE SAME WAY.
- PUT THE CARDSTOCK ON THE OUTSIDE OF THE COPY PAPER TO ACT AS A COVER.
- KEEP TRACK OF YOUR OBSERVATIONS AND OUTCOMES BY DRAWING PICTURES OF WHAT YOU SEE AND WRITING DOWN DESCRIPTIONS AND MEASUREMENTS.

EXPERIMENT 2: WATCHING A PLANT BREATHE

- PICK A LEAF OFF A PLANT. (LEAF MUST BE FRESH TO WORK.)
- PLACE THE LEAF IN A CLEAR CUP AND COVER WITH WATER.
- LEAVE THE LEAF IN THE SUN FOR A WHILE AND THEN OBSERVE. ARE THERE TINY LITTLE BUBBLES AROUND THE LEAF? THIS IS OXYGEN LEAVING THE STOMATA. THE TINY HOLES IN THE LEAF. THIS IS THE SAME THING THAT WOULD HAPPEN IF YOU BREATHED OUT UNDERWATER.
- RECORD WHAT YOU SEE IN YOUR JOURNAL.

CLOSELY EXAMINE YOUR LEAF:

- ONE THING ALL SCIENTIST DO IS TO CLOSELY OBSERVE (OR LOOK) AT WHAT THEY ARE STUDYING.
- USING YOUR MAGNIFYING GLASS LOOK CLOSELY AT YOUR LEAF. WHAT DO YOU SEE? ARE THERE DIFFERENCES BETWEEN THE TOP OF THE LEAF AND THE BOTTOM? RECORD YOUR OBSERVATIONS IN YOUR JOURNAL.

LESSON PLAN CREATED BY WENDY FERGUSON, PROGRAM COORDINATOR