

1 THE TREE AND ITS MICROCLIMATE



GOAL	The students will discover how a tree or shrub in a garden or park affects its local microclimate through experiments and research outside.
TIME	60–90 minutes
AGE	8–99
WHERE	A pleasant place with trees or shrubs and open space
WHEN	Warm parts of the year
YOU NEED	Seat cushions, thermometers, hygrometers, scales, shallow bowls, clothes line, clothes pegs, absorbent cloth, and parasol

! INTRODUCTION

A tree maintains a microclimate around itself and forms a shadowed space, because of its crown, with air that is more humid thanks to transpiration (leaf vents discharging water vapour) and guttation (vents discharging liquid water). That is why we feel cooler and breathe better in the forest because the temperatures there do not rise as high during the day compared to a meadow, for instance, and do not fall as low at night.

1 COMPARING WITH THE SENSES

The students should spend some time, 2–5 minutes, lying or sitting in the sun on some open grass on a warm day, then spend the same amount of time under a parasol (gazebo roof etc.) and then again under some trees (in a forest, a grove etc.). How did it feel in the meadow, under the parasol and under the trees? The students should try to describe the different feelings.

2 DRYING LAUNDRY

Now test your feelings: Soak three identical pieces of cloth in water and wring out well.

Hang each one of the pieces in each of the three places (open space, under the parasol, and under the trees). How long will it take before

the fabric dries in each of these places? You can also weigh each piece of fabric before and after the experiment and find out how much water evaporates.

Keep a fourth piece of fabric as a control sample which you will not soak or dry; it should weigh the same as the dried fabric and also serves as a comparison between it and the wet fabric.

The cloth pieces should be weighed before and after the experiment. Write the weights on the cloth pieces with a soft pencil. That way the students will be able to compare the original weight, the weight of the wet fabric (write this weight on the cloth as well) and the same fabric after some time of drying.

3 TEMPERATURE AND HUMIDITY

The students should try a similar experiment with a thermometer and hygrometer and measure the temperature and humidity in the same three places outside, taking care not to measure temperature or humidity in direct sunlight. A meteorological booth can be constructed from a white shoe box and the devices placed into it. The same instruments can be used to measure each of the locations, or more can be used if they are available but they should measure in the same way!



High school students can use a dry and wet thermometer to calculate absolute humidity. In that case the wet temperature and absolute humidity should be added to the worksheet (there is space for it).

4 EVAPORATION

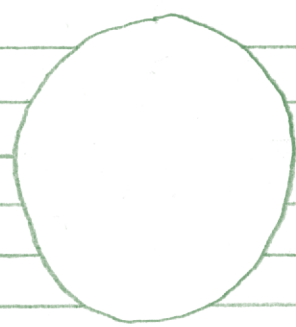
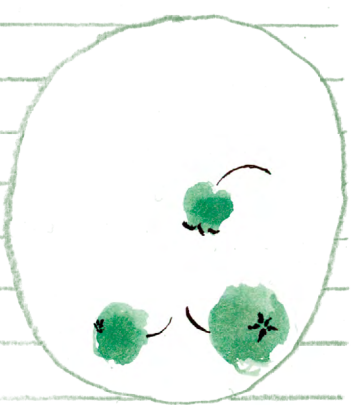
Evaporation is a term describing the process of a substance moving from a liquid state to a gaseous one. Another experiment uses three wide and flat identical containers for water (as wide as possible – basins, baking trays or flower pot dishes). The students should pour an equal amount of water into all of them and place one in each of the three spots and measure how much water has evaporated after an hour.

5 SHARING

Finally, the students will come together and compare the results and conclusions that each group has. What was a surprise? What was expected? What other questions arose? How do trees affect their microclimate? Is there a difference between deciduous and coniferous trees? Why?

EVALUATION OF THE ACTIVITY'S GOAL (EVIDENCE OF LEARNING)

- Through experiments and measurements outside, the students obtained the values that they, within a group, wrote into a worksheet.
- The students compared three differing places outside on a hot day (by feeling, temperature measurement, comparison of humidity and evaporation).
- They tried to explain their comparisons with others.



The right side of the page features a large area of horizontal green lines for writing. Two hand-drawn diagrams are present: the upper one shows a tree cross-section with three green leaves, each with a small black dot and a curved line representing a water droplet being released (evaporation); the lower one is an identical but empty tree cross-section.

1.1 TREE AND CLIMATE / MICROCLIMATE WORKSHEET

MEASUREMENTS AND OBSERVATIONS:

1. COMPARING WITH THE SENSES –

Write down or draw how you feel when you sit or lie down for 2–5 minutes on a warm day:

- a) in full sun...
- b) under a parasol...
- c) under a bushy tree...

2. DRYING LAUNDRY – How long did it take for the fabric to dry?

(Or what was the difference in weight of the substance after a specific time.)

a) in full sun	time:	weight difference:
b) under a parasol	time:	weight difference:
c) under a bushy tree	time:	weight difference:

3. TEMPERATURE AND HUMIDITY –

What are the values?

a) in full sun	temperature:	humidity:
b) under a parasol	temperature:	humidity:
c) under the bushy tree	temperature:	humidity:

1.2 TREE AND CLIMATE / MICROCLIMATE WORKSHEET

4.

EVAPORATION –

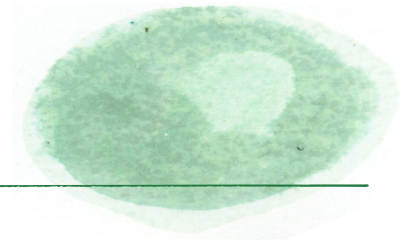
How was it different? How much water evaporated in each place?

- a) in full sun
- b) under a parasol
- c) under a bushy tree

5.

SUMMARY –

Fill in the unfinished statement:



Under the tree it is _____
than in the open, in full sun, because _____

Under the tree it is _____
than under a parasol because _____

The tree affects its microclimate due to _____

