



By Georgia Brown's Fifth-Grade Students, Sanibel (Florida) Elementary School

Our school is on Sanibel Island, a barrier island located on the southwest coast of Florida. Every person and every plant in Florida gets warmed by the sun. People perspire and plants transpire. So, when our class began to study trees, we were especially interested in transpiration, or the process by which plants give off water through their leaves. Some of us investigated

The gumbo limbo tree, *Bursera simaruba*, has red, papery bark and bunches of small leaves. Typically, the tree grows to be about 18 meters tall.

Gumbo Limbo Leaves

photo by Al Mihiken/JN Ding Darling NWR

Sea Grape and Gumbo Limbo Leaf Transpiration

photo © 1996 by Robert Clay

transpiration in sea grape trees; the rest of us investigated transpiration in the gumbo limbo tree. We chose these trees because we have many of both kinds of trees on our school campus and because these trees have very different kinds of leaves. Sea grape leaves are large and simple (a single leaf on a stem), and gumbo limbo leaves are small and compound (many tiny leaves, or leaflets, share one stem). Of course, it was also a help that both kinds of trees had branches we could reach safely without standing on anything!

We wanted to find out:

1. Does water pass from leaves into the air?
2. Do the large sea grape leaves transpire more water than the smaller gumbo limbo leaves?

We predicted:

1. Water passes from leaves into air.
2. Larger leaves transpire more water than smaller leaves.



Sea Grape Leaves

The sea grape tree, *Coccoloba uvifera*, is salt tolerant and grows in sandy soil. It has large, fleshy leaves; smooth bark; and clusters of edible red fruit. Typically, the tree grows to be about 7.5 meters tall.



courtesy of the authors

Our procedure:

We divided into groups of four or five students. Each group cut off a corner of a plastic bag and then taped a test tube in the hole.

Outside in the schoolyard, some groups placed plastic bags over several leaves of gumbo limbo trees, and some groups placed bags over single leaves of sea grape trees. We sealed the bags tightly around the branches with masking tape, making sure the test tubes pointed toward the ground, and left the bags on the trees for 24 hours. The

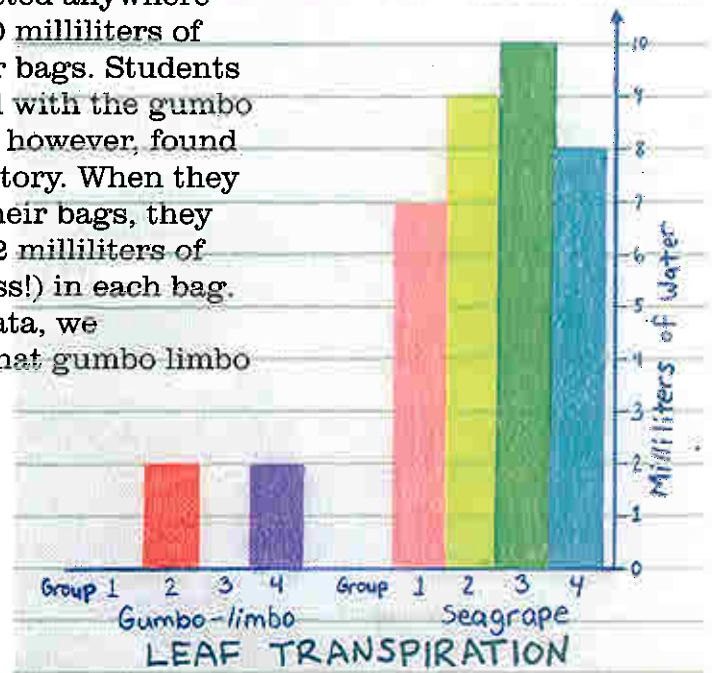
next day when we checked the bags, we

observed that water had collected in the test tubes, and then we measured how much we collected!

We found out:

Water does transpire through plant leaves in varying amounts. For example, those of us who worked with sea grape leaves collected anywhere from 7 to 10 milliliters of water in our bags. Students who worked with the gumbo limbo trees, however, found a different story. When they examined their bags, they found only 2 milliliters of water (or less!) in each bag. From our data, we concluded that gumbo limbo

leaves transpire less than sea grape leaves. Compared to gumbo limbo leaves, sea grape leaves are the transpiration champions! One sea grape leaf transpires as much or more than one bunch of gumbo limbo leaves. To conclude our study, we made bar graphs showing our results.



CHALLENGE

When the Water "Leaves" Comes out of leaves?

Do you really believe that water comes out of leaves?

Try sealing plastic bags over groups of leaves from different trees to find out for yourself.

Where would the water go if it were not going into your bags?

TELL ME ABOUT TRANSPIRATION

Leaves are made up of many layers, each of which plays an important role in how a leaf works. One role of the outermost layers of the leaf, called the epidermis, is to serve as the leaf's protective skin. Key materials necessary for plant growth pass through the epidermis through tiny openings on the surface of the leaf called stomata. During transpiration, the process by

which plants give off water through their leaves, water enters a plant through the roots, travels up the plant stem through specialized tubes, enters the leaves, and then is released into the air as water vapor through the stomata. Trees need transpiration to survive, but transpiration can sometimes cause the plant to lose too much water, especially during droughts. It is not hard to measure transpiration and to investigate how such forces

as wind, sunlight, soil moisture, and temperature affect transpiration.

