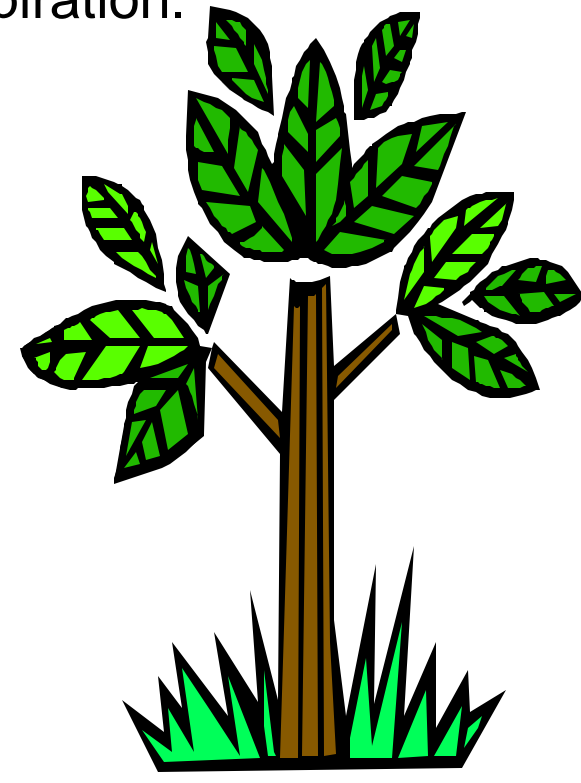


The Effects of Tree Response Due to Evapotranspiration

Abstract

Abstract:

The purpose of this project is to investigate the spatial and temporal effects of trees by evapotranspiration (ET) using a combination of approaches that include tree bole expansion, using the Dynamax soil moisture profiler, and using the Theta probe. Evapotranspiration from four trees, which include an American Sycamore, A pine Tree, and two deciduous trees that were measured in order to determine a trees response to moisture and evaporative cooling in the summer season. The study area for analysis was a green space located in the southwest region of Atlanta, Georgia. We monitored and derived that there is an established relationship between soil moisture and tree circumference. This relationship is displayed throughout the data and proves that trees pull moisture from the soil, which in turns allow the trees to expand in diameter, that moisture is then released through the leaves back into the environment. This process is called evapotranspiration.



Hypothesis

- Soil Moisture is relative to evapotransportation

- The water in soil is transported up through the roots of the the tree which causes the tree to expand.

- The water in the tree then travels to the leaves were the water leaves as oxygen and the tree decreases in width size.

Purpose

- To determine whether or not soil moisture content is relative to evapotranspiration process dealing with trees.

Methods

Subjects

- 2 Slash Pine Trees
- 1American Sycamore
- 1 Planetree Maple
- 2 Deciduous Trees
- Surrounding soil (Red Georgia dirt)

Materials

- Theta Probe
- Data Logger
- 1 ruler
- 1 brick
- 1 hedge cutter
- Humidity monitor
- Temperature reader
- Tape measure



Procedure

Site development

- Cut hedges and branches to create a trail
- Locate four trees
- Tag trees (identify)
- Nail trees with 2 inch nails one inch deep

Stream development

- Install a water gauge in stream
- Cut hedges and branches to create a trail

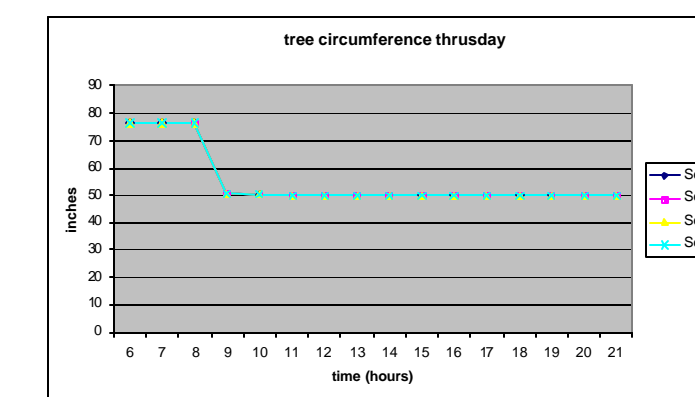
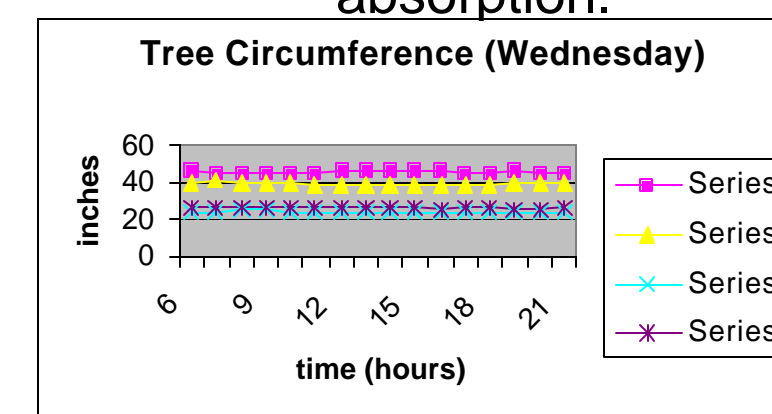
Collecting data

- Wrap tape measure around each tree to measure circumference in inches.
- Measure air temperature and humidity with temperature/humidity sensors.
- Determine soil moisture content with the theta probe.
- Measure soil temperature with the data logger.
- Record all data on a customized spreadsheet.
- The barometric pressure and cloud covering come from www.weather.unysis.com

Results

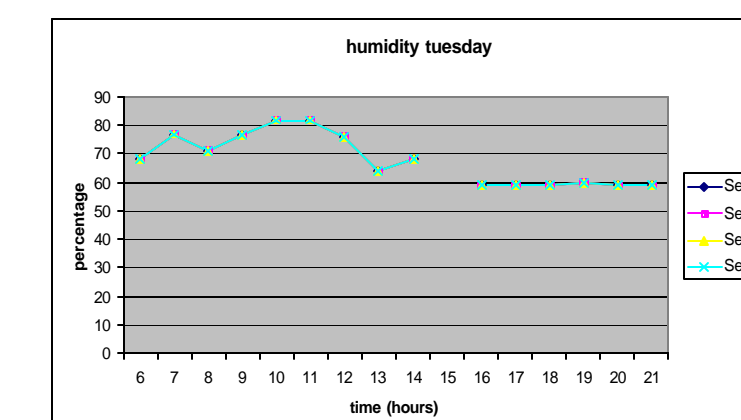
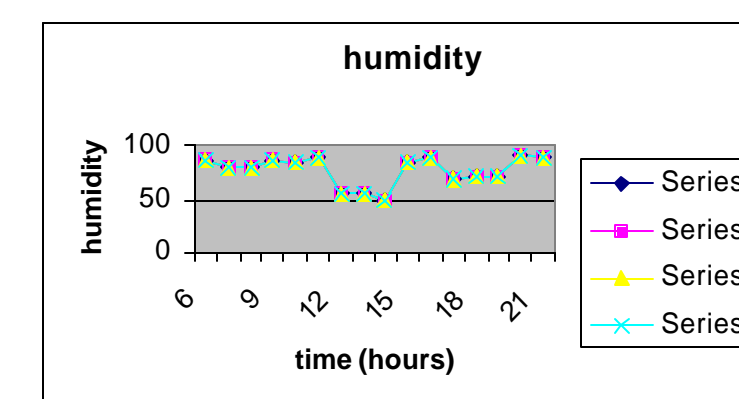
Tree Circumference Measurements

The tree circumference measurements determine how much water is being absorbed into the trees. All four trees were measured hourly to get a good and accurate measurement of daily tree absorption.



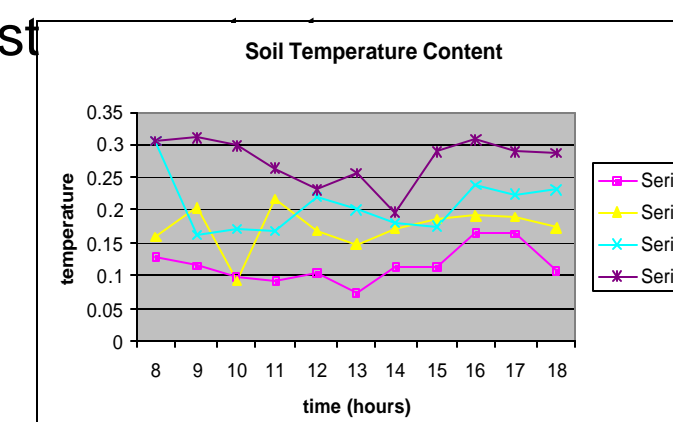
Humidity

The humidity is important to the tree circumference measurements because it helps to determine how much water the tree is absorbing. The humidity around all four trees was measured hourly to help have a accurate reading along with the tree circumference measurements.



Soil Moisture Content

The soil moisture content determines how much water (moisture) is in the soil at the time the tree is absorbing. The soil moisture content was measured hourly because as the humidity changes hour by hour so does the soil moist



Conclusion

- The study examined the capacity of tree water absorption in Atlanta, Georgia between two Slash Pine trees, one Maple tree, one American Sycamore tree, and two deciduous trees

- The study helps to determine drought in Atlanta, Georgia by measuring tree circumferences on three different types of trees.

- The results of the project proved that evapotranspiration does take place in trees. The rate of evapotranspiration is determined by outside weather ambient conditions which include, rainfall, wind speed, solar radiation, humidity, soil moisture content, temperature, soil temperature, cloud cover and barometric pressure.

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