THE INFLUENCE OF ASPHALT ON SURROUNDING SHORT-GRASS SOIL TEMPERATURE

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ABSTRACT

This project is on the influence of asphalt on surrounding short-grass soil temperature. The data that was taken supported the hypothesis: The closer the soil is to the asphalt the warmer the soil will be. Then after the data was taken it was recorded. The problem of the project is, “Should a family plant their plants closer to the asphalt or farther from the asphalt?” Finally, after review of the data, the closer the soil is to the asphalt the warmer the soil is. The soil is warmer because of the albedo on the asphalt which radiates heat to the short-grass area that is around it.

PROBLEM

My family wanted to know if they were to plant some plants and then wanted the warmest soil as possible should they plant them closer to the asphalt or farther away? In the past my family has tried many things. They have looked on the internet. My family has even tried using a flash light. They came to the conclusion that the problem is where they plant their plants. I am going to take three different temperatures of the soil; one by the asphalt, one three meters from the asphalt, and one six meters from the asphalt. Then I will see which part is the warmest of.

HYPOTHESIS

If I take soil temperature on short-grass, I think that the soil closest to the asphalt will be the warmest.

MATERIALS

- Thermometer
- Nail
- Meter tape
- Watch
- Cloud chart
- Flags

PROTOCOL

GLOBE PROTOCOL STATES: "Select relatively flat, non compacted sunny area - 5m diameter w/uniform characteristics. Note: If it has rained within the past 24 hours. insert thermometer into a wooden block so 7 cm extends beyond bottom of block. Calibrate thermometer using atmosphere calibration thermometer. If > 2° C difference, reset thermometer per manufacturer's directions. Make a pilot hole 5cm deep using nail. Remove nail using twisting motion. If ground cracks/bulges, move 25 cm; retry. Insert thermometer into block to 7 cm. Insert block + thermometer into pilot hole. Record temperature at 2 minutes; repeat at 1 minute intervals until consecutive reading are 0.5 - 1.0° C; record on data sheet. Remove block and thermometer using twisting motion; remove thermometer from block. Insert thermometer into pilot hole to 12 cm. Record temp after 2 minutes; repeat at 1 minute intervals until consecutive reading are 0.5 - 1.0° C; record on data sheet."

First I used the nail to make a hole 10cm into the ground and placed a thermometer and let it set for 2mins. Then I used the meter tape and went 3 meters from the first spot and repeated the process. Next I used the meter tape and went 6 meters from the first spot and repeated the process. Finally I found the cloud cover and recorded my data.

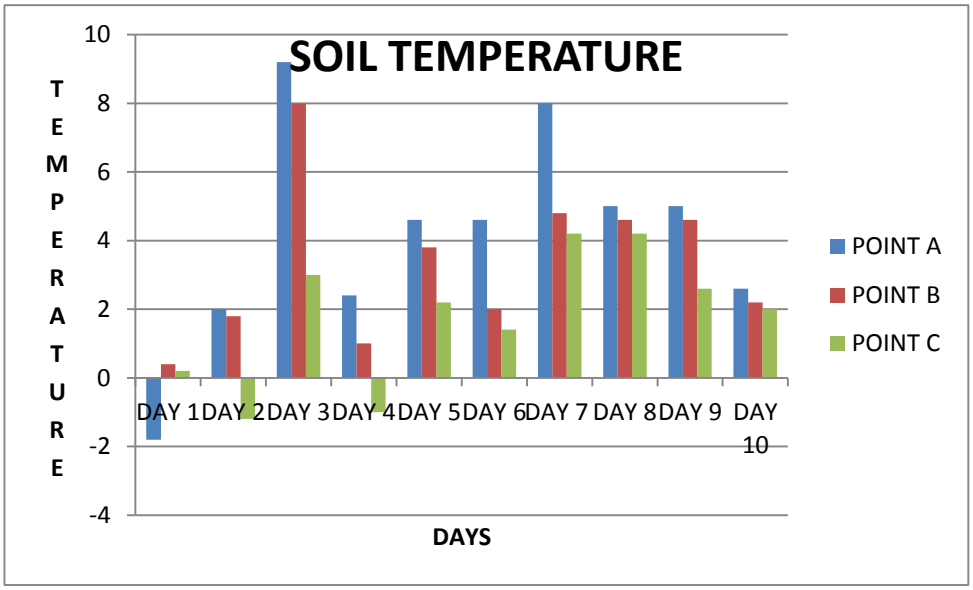
CONCLUSION

My hypothesis was that if I take soil temperature over short-grass with the albedo (absorption of energy) of asphalt I think that the closer the soil is to the asphalt the warmer the soil will be.

My conclusion is that the closer the soil is to the asphalt the warmer the soil is, the farther the soil is the colder the soil is. The data supported my hypothesis. What I found out is that the amount of sun shine and cloud cover had an effect on the soil temperature. On the day it was sunny the sun was shining on the lower part of the grass causing the soil to heat up. The asphalt was also warmer due to the albedo, which radiates heat it is found on darker thing such as asphalt.

My problem can be answered now if my family wants to plant plants they should plant the plants closer to the asphalt so the heat can radiate heat to the soil to keep the plant alive.

	DAY 1	DAY 2	DAY 3	DAY 4	DAY 5	DAY 6	DAY 7	DAY 8	DAY 9	DAY 10
POINT A	-1.8	2	9.2	2.4	4.6	4.6	8	5	5	2.6
POINT B	0.4	1.8	8	1	3.8	2	4.8	4.6	4.6	2.2
POINT C	0.2	-1.2	3	-1	2.2	1.4	4.2	4.2	2.6	2



RESULTS

POINT A: IS BETWEEN THE ASPHALT AND SHORT GRASS, POINT B: IS 3M FROM WHERE THE ASPHALT IS, POINT C: IS 6M FROM THE ASPHALT AND THE TEMPATURE ARE MESURED IN CELSIUS.

DAY ONE: SOIL TEMPERATURE OVER POINT A: -1^{C}, -1^{C}, -2^{C}, -3^{C}, -2^{C} FOR AN AVERAGE OF -1.8^{C}. SOIL TEMPERATURE OVER POINT B: -2^{C}, -1^{C}, -1^{C}, 2^{C}, 4^{C} FOR AN AVERAGE OF 0.4. SOIL TEMPERATURE OVER POINT C: -1^{C}, -2^{C}, -1^{C}, -1^{C}, 2^{C}FOR AN AVERAGE OF 0.2. CLOUD COVER: STRATOCUMULUS.

DAY TWO: SOIL TEMPERATURE OVER POINT A: 1^{C}, 3^{C}, 1^{C}, 2^{C}, 3^{C} FOR AN AVERAGE OF 2^{C}. SOIL TEMPERATURE OVER POINT B: 2^{c}, 1^{c}, 1^{c}, 2^{c}, 3^{c} FOR AN AVERAGE OF 1.8^{C}. SOIL TEMPERATURE OVER POINT C: -1^{C}, -1^{C}, -2^{C}, -1^{C}, -1^{C} FOR AN AVERAGE OF -1.2^{C}. CLOUD COVER: ALTOSTRATUS.

DAY THREE: SOIL TEMPERATURE OVER POINT A: 9^{c}, 8^{c}, 10^{c}, 9^{c}, 10^{c} FOR AVERAGE OF 9.2. SOIL TEMPERATURE OVER POINT B: 8^{C}, 9^{C}, 8^{C}, 8^{C}, 8^{C} FOR AN AVERAGE OF 3^{C}. SOIL TEMPERATURE OVER POINT C: 2C, 3^{C}, 3^{C}, 4^{C}, 3^{C} FOR AN AVERAGE OF 3^{C}. CLOUD COVER: ALTOSTRATUS.

DAY FOUR: SOIL TEMPERATURE OVER POINT A: 2^{C}, 1^{C}, 3^{C}, 4^{C}, 2^{C} FOR AVERAGE OF 2.4^{C}. SOIL TEMPERATURE OVER POINT B: 2^{C}, 1^{C}, 1^{C}, 2^{C}, -1^{C} FOR AN AVERAGE OF 1^{C}. SOIL TEMPERATURE OVER POINT C: -1^{C}, 1^{C}, -2^{C}, -2^{C}, -1^{C} FOR AN AVERAGE OF -1^{C}. CLOUD COVER NIMBOSTRATUS. *SNOWING*

DAY FIVE: SOIL TEMPERATURE OVER POINT A: 5^{C}, 3^{C}, 5^{C}, 4^{C}, 6^{C} FOR AN AVERAGE OF 4.6^{C}. SOIL TEMPERATURE OVER POINT B: 3^{C}, 4^{C}, 5^{C}, 3^{C}, 4^{C} FOR AN AVERAGE OF 3.8^{C}. SOIL TEMPERATURE OVER POINT C: 2^{C}, 3^{C}, 2^{C}, 1^{C}, 3^{C} FOR AN AVERAGE OF 2.2^{C}. CLOUD COVER: CIRROSTRATUS.

DAY SIX: SOIL TEMOERATURE OVER POINT A: 5^C, 5^C, 7^C, 5^C, 6^C FOR AN AVERAGE OF 4.6^C. SOIL TEMPERATURE OVER POINT B: 2^C, 2^C, 3^C, 2^C, 1^C FOR AN AVERAGE OF 2^C. SOIL TEMPERATURE OVER POINT C: 1^C, 2^C, 1^C, 2^C, 1^C FOR AN AVERAGE OF 1.4^C. CLOUD COVER: CIRRUS.

DAY SEVEN: SOIL TEMPERATURE OVER POINT A: 9^C, 8^C, 7^C, 7^C, 9^C FOR AN AVERAGE OF 8^C. SOIL TEMPERATURE OVER POINT B: 5^C, 4^C, 5^C, 4^C, 6^C FOR AN AVERAGE OF 4.8^C. SOIL TEMPERATURE OVER POINT C: 4^C, 5^C, 3^C, 4^C, 5^C FOR AN AVERAGE OF 4.2^C. CLOUD COVER: ALTOSTRATUS.

DAY EIGHT: SOIL TEMPERATURE OVER POINT A: 6^C, 5^C, 4^C, 5^C, 5^C FOR AN AVERAGE OF 5^C. SOIL TEMPERATURE OVER POINT B: 6^C, 5^C, 3^C, 4^C, 5^C FOR AN AVERAGE OF 4.6^C. SOIL TEMPERATURE OVER POINT C: 5^C, 4^C, 3^C, 4^C, 5^C FOR AN AVERAGE OF 4.2^C. CLOUD COVER: CUMULUS.

DAY NINE: SOIL TEMPERATURE OVER POINT A: 6^C, 7^C, 6^C, 5^C, 6^C FOR AN AVERAGE OF 6^C. SOIL TEMPERATURE OVER POINT B: 4^C, 5^C, 6^C, 4C, 5C FOR AN AVERAGE OF 4.8^C. SOIL TEMPERATURE OVER POINT C: 3^C, 4^C, 4^C, 3C, 5^C FOR AN AVERAGE OF 3.8^C. CLOUD COVER: CUMULUS.

DAY TEN: SOIL TEMPERATURE OVER POINT A: 4^C, 3^C, 3^C, 2^C, 1C FOR AN AVERAGE OF 2.6^C. SOIL TEMPERATURE OVER POINT B: 3^C, 2^C, 3^C, 1^C, 2C FOR AN AVERAGE OF 2.2^C. SOIL TEMPERATURE OVER POINT C: 2^C, 1^C, 2^C, 3^C, 3^C FOR AN AVERAGE OF 2^C. CLOUD COVER: NIMBOSTRATUS. *SNOWING*.

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