

North, South, East, West: A Study of Microclimate.

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ABSTRACT

The problem of too short of a growing season is a problem faced annually by gardeners. The hypothesis for this research study is the south side of a building would be the most absorbent of sunlight, resulting in warmer temperatures and resulting in a longer growing season. Surface temperatures were taken on the north, south, east, and west sides of a house and a school. Out of the four directions south and west were the warmest side of both a house and school. It would be best to plant a garden on the south or west sides of a building according to the data. Doing a similar study on more buildings or for an entire year should confirm the validity of this research project.

HYPOTHESIS

I believe that between North, South, East, or West side of a building, the South side will absorb the most sunlight on short-grass, thus keeping it warmer and throughout the year extend the growing season.

PROBLEM

I wanted to find out which side of my house, North, South, East, or West would be the best side for a climate suitable to extend the growing season. I want to plant a garden for my family as a Lithuanian tradition and I want to know where my plants will grow best. As a result of this project I want to be able to find out which of the four sides of my house would be the best to have a longer lasting garden.

MATERIALS

Infrared Thermometer

Data Sheets

Oven Mitt

www.globe.gov

Clip Board

PROCEDURES

GLOBE Protocol: Surface Temperature

I used a Fluke 63 infrared thermometer (IRT) to take surface temperatures. I choose four sites in the four directions. I took nine temperatures in each spot, in two different locations. The reason I used the IRT to take the surface temperature in a short-grass area because it is one listed as approved by the GLOBE Program.

RESULTS

All temperatures are in degrees Celsius.

DAY ONE

Roswell Kent Middle School: 90% cloud coverage (Cumulonimbus with snow flurries)

North: Time: 10:40

2.4, 3.6, 2.8, 2.6, 2.2, 3.4, 2.2, 2.0, 2.4

Average Temperature: 2.6

East: time: 10:38

2.4, 2.6, 2.8, 2.6, 2.2, 2.4, 3.2, 2.8, 2.8

Average Temperature: 2.6

West: time: 10:43

2.4, 2.0, 1.8, 2.4, 1.8, 2.6, 2.0, 2.6, 2.4

Average Temperature: 2.2

South: time: 10:45

3.6, 3.4, 4.2, 4.0, 3.6, 4.2, 4.4, 4.0, 4.6

Average Temperature: 4.0

HOME: 90% cloud coverage, Stratocumulus

North: time: 3:34

2.2, 2.2, 2.4, 2.2, 1.6, 1.8, 2.0, 2.0, 0.6

Average Temperature: 1.8

East: time: 3:30

0.8, 0.0, 1.0, 0.6, 0.2, 0.6, 0.4, 0.2, 1.2

Average temperature: 1.3

West: time: 3:34

3.2, 4.0, 3.8, 3.2, 3.6, 3.6, 3.8, 4.4, 6.9

Average Temperature: 4.0

South: time: 3:38

3.0, 2.8, 2.4, 2.4, 2.6, 3.2, 1.8, 2.2, 3.2

Average Temperature: 3.9

DAY TWO

Roswell Kent Middle School: 10% cloud
coverage: Cirrus

North: time: 10:52

3.2, 2.6, 2.6, 1.8, 1.6, 1.4, 2.0, 0.6, 2.4

Average Temperature: 2.1

East: time: 10:48-10:49

7.4, 8.2, 9.1, 7.4, 6.4, 9.1, 8.8, 7.6, 7.2

Average Temperature: 7.9

West: time: 10:55-10:56

9.0, 11.6, 8.2, 7.4, 8.0, 9.2, 9.0, 9.4, 9.0

Average Temperature: 8.9

South: time: 10:58-10:59

6.6, 6.8, 7.8, 7.4, 6.4, 6.6, 6.6, 7.8, 7.2

Average Temperature: 7.0

Home: 5% cloud coverage: Cumulus

North: time: 5:25-5:26

-3.2, -4.0, -3.8, -7.0, -5.2, -5.2, -5.8, -5.2, -4.0

Average Temperature: -4.8

East: time: 5:33

-3.2, -3.2, -1.0, -2.0, 0.8, -1.4, -1.6, -2.0, -1.0

Average Temperature: -3.8

West: time: 5:27

-2.1, -2.6, -2.0, 2.0, 1.4, 1.8, 1.8, 2.0, 1.4

Average Temperature: -0.3

South: time: 5:31

-2.2, -3.0, -2.2, -3.6, -4.4, -4.4, -4.4, -5.6, -3.6

Average Temperature: -3.7

Day Three

Roswell Kent Middle School

20% cloud coverage, Stratus, (ground frosty)

North: time: 10:43

2.6, 2.8, 3.8, 2.4, 2.6, 1.9, 2.4, 1.8, 2.8

Average Temperature: 2.5

East: time: 10:39

8.8, 7.2, 8.2, 8.4, 10.4, 6.8, 8.6, 8.9, 10.2

Average Temperature: 8.6

West: time: 10:45-10:46

7.4, 4.4, 4.6, 2.6, 2.8, 8.6, 7.4, 11.8, 13.6

Average Temperature: 7.0

South: time: 10:49

11.2, 10.2, 10.2, 10.6, 10.2, 8.4, 9.8, 11.8, 11.6

Average Temperature 9.5

Home: 0% cloud coverage, damp, 2 contrails long lived

North: time: 4:45-4:46

-2.2, 1.4, -1.6, 0.6, -6.2, -6.6, -3.0, -3.0, -2.8,

Average Temperature:

East: time: 5:00

3.4, 1.6, 1.8, 2.4, 1.4, 2.4, 2.4, 0.8, 1.2

Average Temperature: 1.9

West: time: 4:56

2.6, 2.6, 1.6, 2.4, 3.6, 6.6, 3.0, 2.0, 3.2

Average Temperature: 3.0

South: time: 4:58-4:59

1.6, 1.2, 0.4, 0.4, 1.4, 0.8, 0.2, 0.8, 1.2

Average Temperature: 1.0

Day Four

Roswell Kent Middle School 100% cloud

coverage: Stratus: muddy-wet

North: time: 10:41

15.2, 15.2, 15.4, 15.8, 15.2, 15.4, 15.4, 15.8, 16.0

Average Temperature: 15.4

East: time: 10:38

14.8, 15.2, 14.8, 14.8, 15.2, 14.8, 15.0, 14.8, 13.2

Average Temperature: 14.7

West: time: 10:43

16.2, 15.8, 16.8, 16.6, 15.6, 15.8, 15.6, 16.2, 15.4

Average Temperature: 16.0

South: time: 10:46

15.5, 15.4, 15.6, 15.6, 15.2, 15.6, 15.2, 15.4, 15.4

Average Temperature: 15.4

Home: 100% cloud coverage, Nimbostratus, Raining

North: time: 4:51

11.2,11.2, 11.0, 10.8, 12.0, 11.2, 11.2, 11.4, 11.4

Average Temperature: 11.2

East: time: 4:57

12.4, 12.0, 12.2, 12.2, 11.6, 11.2, 11.2, 11.0, 11.2

Average Temperature: 10.3

West: time: 4:53

17.0, 16.4, 16.4, 15.4, 13.2, 12.0, 12.2, 11.8, 11.8

Average Temperature: 14.0

South: time: 4:55

11.8, 12.2, 12.0, 12.2, 12.4, 12.2, 12.0, 12.0, 11.8

Average Temperature: 12.0

Day Five

Roswell Kent Middle School: 100% cloud coverage, Nimbostratus, Raining

North: time: 10:36

10.4, 10.4, 9.8, 9.6, 9.8, 0.2, 9.6, 9.7, 9.6

Average Temperature: 8.7

East: time: 10:34

9.4, 9.2, 9.0, 8.6, 9.4, 9.4, 9.2, 9.2, 9.0

Average Temperature: 9.1

West: time: 10:38

9.8, 9.4, 9.4, 9.6, 9.2, 9.2, 9.4, 9.2, 9.4

Average Temperature: 9.4

South: time: 10:42

9.9, 9.8, 12.8, 10.0, 10.4, 13.8, 9.6, 10.6, 10.6

Average Temperature: 10.8

Home: 100% cloud coverage, Cumulonimbus, Raining

North: time: 4:42

0.8, 0.8, 0, 1.0, 2.2, 1.4, 1.6, 2.2, 1.0

Average Temperature: 1.2

East: time: 4:49

0.5, 0.2, 0.2, 0, 0, 0.8, 0.5, 0.6, 0.8

Average Temperature: 0.4

West: time: 4:43

2.4, 1.2, 4.0, 1.4, 2.8, 2.2, 2.4, 3.4, 3.0

Average Temperature: 2.5

South: time: 4:43: 4:44

2.0, 1.8, 1.6, 2.8, 1.2, 2.2, 2.4, 1.4, 1.0

Average Temperature: 1.8

Day Six

Roswell Kent Middle School: 100% cloud coverage, Stratus

North: time: 10:43

13.8, 14.4, 13.8, 14.6, 14.4, 14.0, 14.4, 14.6, 14.6

Average Temperature: 14.2

East: time: 10:41

15.4, 15.4, 15.4, 15.4, 15.6, 15.6, 15.8, 15.6, 15.6

Average Temperature: 15.5

West: time: 10:47

16.2, 16.4, 16.4, 15.8, 15.2, 15.2, 15.8, 14.4, 16.6

Average Temperature: 15.7

South: time: 10:50

15.2, 14.8, 14.8, 15.0, 15.0, 15.2, 15.4, 15.2, 14.5

Average Temperature: 15.0

Home: 100% cloud coverage, Cumulus, (damp)

North: time: 4:55

4.2, 5.4, 4.4, 5.0, 5.5, 5.4, 4.2, 5.2, 4.8

Average Temperature: 4.9

East: time: 5:00

3.8, 3.4, 3.8, 4.2, 3.6, 7.8, 4.4, 3.6, 4.0

Average Temperature: 4.2

West: time: 4:56

5.6, 5.8, 5.4, 5.4, 6.2, 6.4, 6.8, 6.2, 5.4

Average Temperature: 5.9

South: time: 4:58-4:59

3.4, 3.2, 3.2, 3.6, 3.6, 3.4, 3.6, 3.4, 4.0

Average Temperature: 3.4

Day Seven

Roswell Kent Middle School: 100% cloud coverage, Nimbostratus, Snowing

North: time: 10:43

4.8, 4.4, 4.6, 5.4, 4.8, 5.2, 5.8, 4.6, 5.2

Average Temperature: 4.9

East: time: 10:41

5.8, 3.8, 5.4, 5.2, 5.4, 5.8, 5.2, 4.6, 5.8

Average Temperature: 5.2

West: time: 10:48

4.2, 4.4, 4.2, 5.8, 4.4, 5.2, 4.6, 3.8, 4.8

Average Temperature: 4.6

South: time: 10:50

5.0, 4.0, 4.8, 4.4, 5.8, 4.4, 5.4, 5.4, 4.0

Average Temperature: 4.8

Home: 100% cloud coverage, Nimbostratus, snowing

North: time: 4:54

6.8, 6.4, 6.6, 6.8, 7.6, 7.8, 7.6, 8.0, 7.6

Average Temperature: 7.2

East: time: 4:58

7.6, 7.6, 7.2, 7.6, 7.5, 8.8, 7.6, 7.2, 7.6

Average Temperature: 7.6

West: time: 4:55

7.6, 7.8, 8.2, 7.4, 7.6, 8.4, 8.8, 7.8, 8.2

Average Temperature: 7.9

South: time: 4:56

7.2, 7.0, 8.2, 7.0, 6.8, 7.6, 7.0, 7.4, 7.8

Average Temperature: 7.3

Day Eight

Roswell Kent Middle School: 50% cloud coverage, Cirrus, ground shaded and frozen

North: time: 10:41

0.8, 0.6, 1.2, 2.0, 1.4, 0.6, 1.8, 1.0, 1.0

Average Temperature: 1.1

East: time: 10:41

7.2, 7.0, 7.0, 7.2, 7.4, 8.0, 7.2, 7.6, 6.8

Average Temperature: 7.2

West: time: 10:49

9.2, 6.0, 6.6, 6.0, 7.2, 7.8, 7.4, 7.6, 7.0

Average Temperature: 7.2

South: time: 10:59

9.8, 9.0, 8.2, 10.6, 9.6, 9.8, 9.4, 9.8, 9.8

Average Temperature: 0.9

Home: 60% cloud coverage, Cirrus

North: time: 5:05

-3.6, 1.6, -2.8, -2.5, -3.2, -3.5, -1.5, -1.5, 1.8

Average Temperature: -1.5

East: time: 5:10

0.6, 0.2, 0.4, 0.6, 0.0, 0.1, 0.6, 0.6, 0.8

Average Temperature: 1.0

West: time: 5:09

0.8, 1.6, 1.6, 0.6, 1.6, 1.2, 2.2, 1.8, 1.8

Average Temperature: 1.4

South: time: 5:08

-0.2, -2.6, -2.6, -2.8, -2.4, -2.8, -1.8, -1.2, -1.2

Average Temperature: 1.4

Day Nine

Roswell Kent Middle School: 50% cloud coverage, Cirrus

North: time: 10:17

0.0, 0.6, 0.4, 0.0, 0.6, 0.2, 0.6, 0.6, 1.0

Average Temperature: 0.5

East: time: 10:15

4.6, 4.8, 3.6, 7.4, 7.4, 7.6, 6.6, 5.6, 5.8

Average Temperature: 5.9

West: time: 10:20

4.2, 5.2, 4.6, 6.0, 7.2, 7.4, 6.4, 5.8, 7.8

Average Temperature: 6.0

South: time: 10:22

9.2, 12.2, 12.4, 10.0, 11.0, 10.2, 10.4, 10.2, 9.8

Average Temperature: 10.6

Home: 70% cloud coverage, Cirrus

North: time: 4:21

-1.2, -2.4, -1.6, -2.0, -1.6, -1.8, -1.2, -2.8, -1.4

Average Temperature:

East: time: 4:24

2.6, 3.4, 3.8, 3.4, 3.8, 3.6, 3.4, 3.4, 3.2

Average Temperature: 3.4

West: time: 4:22-4:23

3.4, 3.6, 3.6, 4.4, 4.4, 3.6, 4.2, 4.6, 4.6

Average Temperature: 4.0

South: time: 4:23

3.8, 3.6, 2.2, 2.4, 2.6, 3.6, 3.2, 4.6, 4.6

Average Temperature: 3.4

Day Ten

Roswell Kent Middle School: 100% cloud coverage, Cumulus

North: time: 10:43

0.4, -1.4, 0.6, -1.2, -1.4, -1.6, -1.4, -1.5, -1.0

Average Temperature:

East: time: 10:41

8.0, 1.0, 1.4, 1.2, 0.2, 0.4, 1.4, 1.4, 1.0

Average Temperature: 1.7

West: time: 10:45

3.5, 0.4, 1.4, 0.0, 0.4, 0.6, 0.4, 0.2, 2.4

Average Temperature: 1.0

South: time: 10:43

0.8, 0.6, 0.4, 0.5, 0.8, 0.2, 0.6, -1.0, 0.0

Average Temperature: 0.3

Home: 100% cloud coverage, Stratus

North: time: 5:35

0.6, 3.8, -1.4, 0.6, 0.6, 0.8, 1.6, 1.2, 2.3

Average Temperature: 1.7

East: time: 5:39

0.6, 1.4, 0.4, 0.4, 1.1, 1.2, 1.2, 0.8, 1.2

Average Temperature: 0.9

West: time: 5:35

4.2, 5.4, 5.2, 5.2, 5.8, 6.6, 6.2, 6.4, 5.4

Average Temperature: 5.6

South: time: 5:36

0.6, 0.2, 0.4, 1.2, 1.2, 0.0, 0.4, 0.2, 0.2

Average Temperature: 0.4

ROSWELL KENT MIDDLE SCHOOL AVERAGES

All temperatures are in degrees Celsius.

NORTH: 2.6, 2.1, 2.5, 15.4, 8.7, 14.2, 4.9, 1.1, 0.5, -1.0

EAST: 2.6, 7.9, 8.6, 14.7, 9.1, 15.2, 5.2, 7.2, 5.9, 1.7

West: 2.2, 8.9, 7.0, 16.0, 9.4, 15.7, 4.6, 7.2, 6.0, 1.0

South: 4.0, 7.0, 9.5, 15.4, 10.8, 15.0, 4.8, 0.9, 10.6, 3.0

SOUTH AVERAGE: 7.83

NORTH AVERAGE: 5.1

EAST AVERAGE: 7.81

WEST AVERAGE: 8.6

HOME AVERAGES

NORTH: 1.8, -4.8, -2.2, 11.2, 1.2, 4.9, 7.2, -1.6, -1.7, 1.1

EAST: 1.3, -3.8, 1.9, 10.3, 0.4, 4.2, 7.6, 1.0, 3.4, 0.4

WEST: 4.0, -0.3, 3.0, 14.0, 2.5, 5.9, 7.9, 1.4, 4.0, 5.7

SOUTH: 3.9, -3.7, 1.0, 12.0, 1.8, 3.4, 7.3, 1.0, 3.4, 0.4

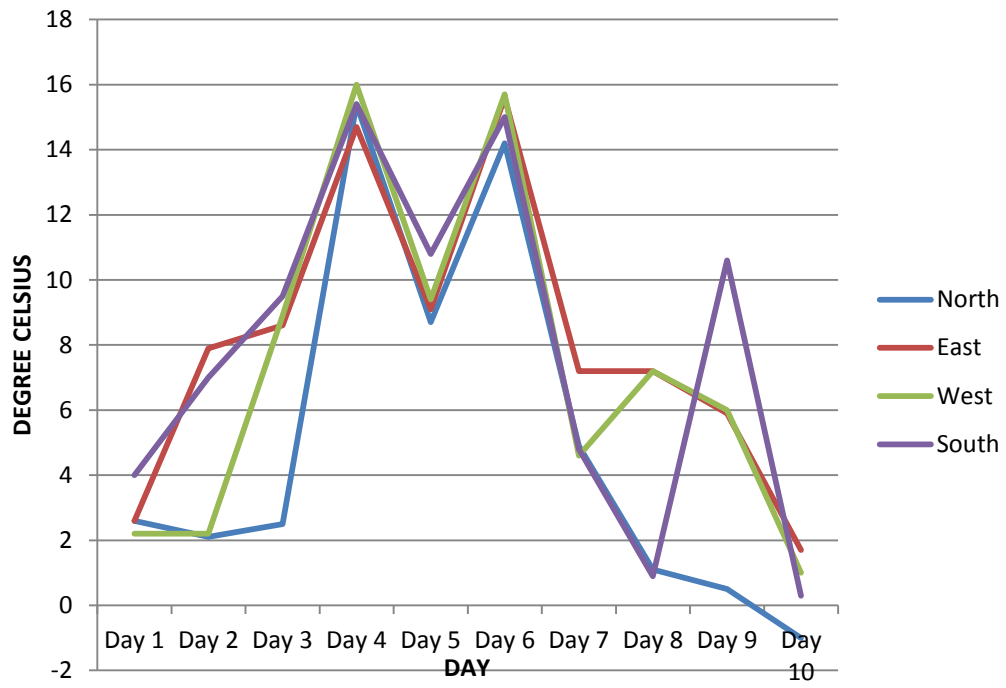
NORTH AVERAGE: -1.7

EAST: 2.6

WEST: 4.5

SOUTH: 3.0

Roswell Kent Middle School



CONCLUSION

During the investigation at home, south was the warmest 90% of the time I collected data. The west side of my house was second warmest 100% of the times I collected data.

During the investigation at Roswell Kent Middle School, south was the warmest 70% of the time I collected data. West is the warmest 30%.

Some errors or problems I ran into at Roswell Kent Middle School were reading or adding up the temperatures from the (IRT) Infrared Thermometer.

For most of my project the results are showing that my hypothesis was supported by my data 90% of the time at home and 50% of the time at Roswell Kent Middle School. To extend this research I would like to collect data for a longer period of time or during different seasons. I would still like to figure out why there are different percents of warmest side between my house and school.

I feel I can better celebrate my Lithuanian heritage by planting a garden along the south side of my house. My mother is very happy and proud to know this.

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