



# Soil Microbial Respiration at Different Drying Temperatures

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## Abstract

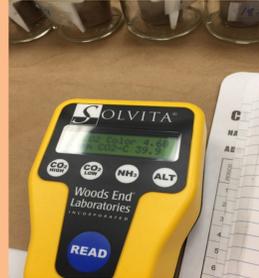
This experiment was designed to look at microbial respiration from different soils around Oklahoma by drying them at different temperatures and measuring carbon dioxide levels using the Solvita Method. Two categories of soil were compared; cultivated and uncultivated. The response from the uncultivated fields showed higher amounts of carbon dioxide in parts per million than the cultivated fields. The difference may be due to the fact that the cultivated fields had higher carbon dioxide release initially when the field was first disturbed and had dramatically decreased over time.

## Methods

We collected soils from nine different locations of both uncultivated and cultivated research fields around Oklahoma. After sieving the soil to 2mm we dried portions at each temperature including field moist, room temperature (about 25°), 45°C, 65°C, and 105°C. We ran two sets of each temperature with some triplicate samples to ensure randomization.

To test our samples, each soil was weighed to 20 grams and placed in a small cup with holes in the bottom. We then placed them in a glass jar and wet them up to 25% moisture. We placed a Solvita paddle into the jar and sealed them for 24 hours.

We took out the paddles one at a time and placed them, gel first, into the Solvita CO2 reader. We read the field moist samples on Alt mode since there were minimal amounts of CO2 output and recorded the color of the paddle and the amount or carbon dioxide in parts per million. The other drying temperatures were read on CO2 low.



Picture 1: tins soil were weighed and dried in.:

Picture 2: Completed setup of Solvita Jar, CO2 paddle included

Picture 3: Solvita Carbon dioxide read meter.

Location	Uncultivated	Cultivated
Chickasha	1	2
Altus	3	4
Tipton	5	6
Idabel	7	8
Bessie	9	10
Goodwell	11	12
Stillwater	13	14
Perkins	15	16
Lahoma	17	18

Table 1: This table represents designates the type of soil to corresponding number used to keep track of it!

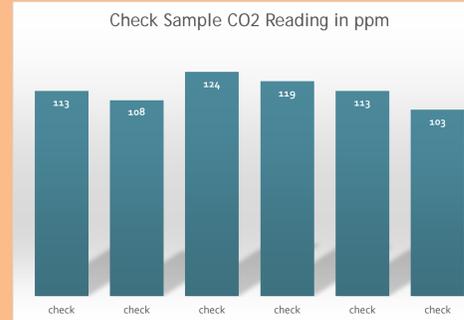
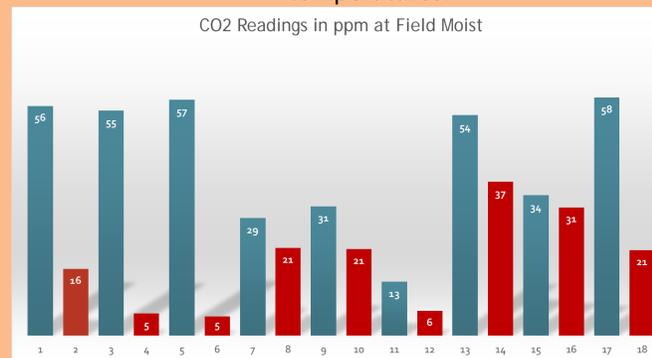
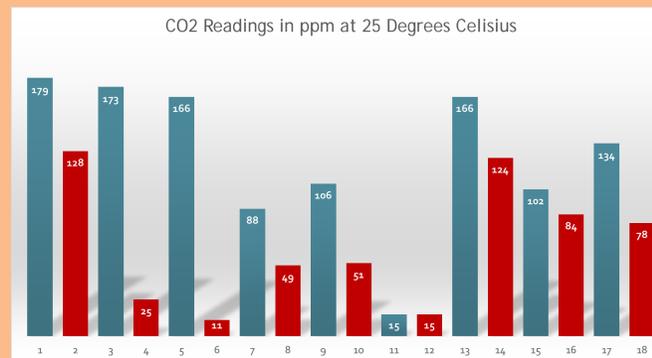


Chart 1: Labels for all soils.

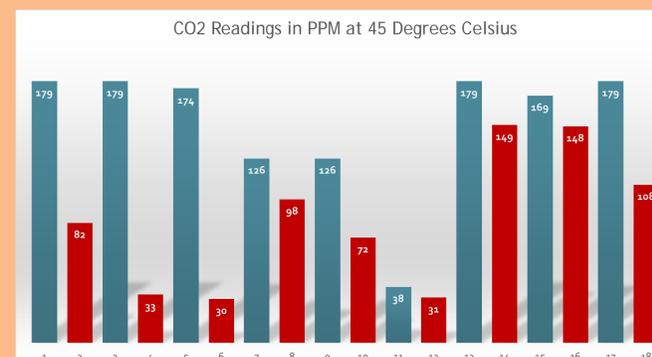
Graph 1: Check samples at all drying temperatures.



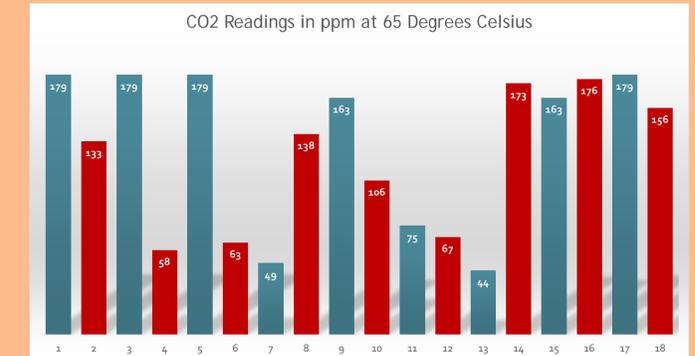
Graph 2: Samples wet up to 25% moisture without going in the oven.



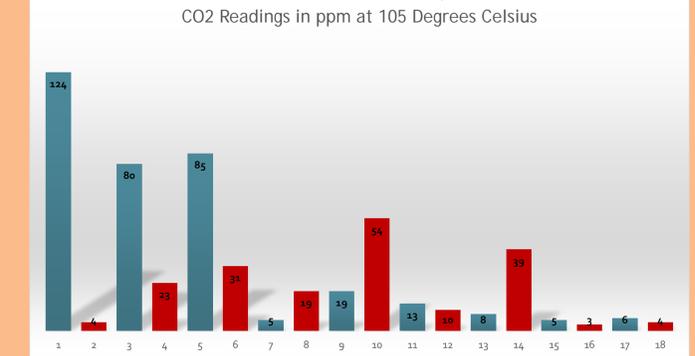
Graph 3: Samples were placed in an oven at 25 degrees Celsius for 24 hours and then wet up to 25% moisture.



Graph 4: Samples were placed in an oven at 45 degrees Celsius 24 hours and then wet up to 25% moisture.



Graph 5: Samples were placed in an oven at 65 degrees Celsius for 24 hours and then wet up to 25% moisture.



Graph 6: Samples were placed in an oven at 105 degrees Celsius for 24 hours and then wet up to 25% moisture.

## Discussion

As the drying temperature of the samples increased so did the carbon dioxide levels the soil put off up to and including 65° Celsius. At 105° Celsius the readings dropped dramatically. This temperature may be too high for different types of microbes. More testing should be done in the 45°C – 105°C range to gather more data and see if there is a temperature higher than 65°C but lower than 105°C that provides peak microbial activity.

The cultivated soils emitted lower levels of carbon dioxide overall compared to the uncultivated soils. This could be due to the disturbance of the uncultivated fields when samples were collected.

## Take Home Points

Uncultivated soils show signs of higher microbial activity based on the carbon dioxide readings that were obtained. 45°C- 65 °C may have an ideal drying temperature to test microbial activity in the soils when determining the health of a soil based on this component. More testing should be performed to find trends in microbial activity in relation to drying temperature.