

The Kingdom of Saudi Arabia  
Ministry of Education

199 secondary School / Riyadh City

***Comparison of acidity, amount of alkaline and alkaloids,  
different types of soil from different regions in Saudi Arabia and  
their impact on agriculture***



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## 1-Abstract

The objective of the study is to compare the acidity and amount of alkaline and alkaloids of different types of soil from several regions in Saudi Arabia and the impact on agriculture in 199 secondary school in Riyadh, Saudi Arabia.

In this study, we used the experimental method where the acidity protocol and the measurement of the amount of bicarbonate in the soil and soil color protocol were measured for several types of soil from several regions of the Kingdom, including Riyadh, Al-Nofod , Al-Qassim , Al-Muzahmiva , Mashaala , 199 secondary school , school73 , During this experiment, we observed the difference in soil acidity, bicarbonate, soil color, and their effect on plant growing in these areas.

From this study, we found that acidity in the soil and the amount of bicarbonates in them adversely affect the soil culture, soil fertility and efficiency of the agricultural crop.

We recommend at the end of the research that:

- 1- Further studies of high and developed level are carried out on the acidity of the soil and its impact on agricultural crops.

This study contributes significantly to the development and improvement of the level of agriculture in our region.

## 2- Research Question and Hypothesis

From our study of soil acidity protocols and the protocol of the amount of bicarbonate planting cultivation in it.

(Alkalinity) in the soil and the color of the soil protocol and our observation of their impact of growing plants in it ,we began to propose our hypothesis :

1- Is there a relationship between soil acidity and land cultivation.

2- Is there a relationship between the amount of bicarbonates in soil and land cultivation

Acid pH: pH (soil pH) Hydrogenation activity of hydrogen ions in soil solution  
Soil acidity is considered a major variable in soil availability of plant nutrients.

Because it affects many chemical processes and it particularly affects the availability of plant nutrients  
alkaline soil: is the alkali which has a high degree of alkalinity and has PH 8.5 or higher , or containing high percent of carbonate and sodium bicarbonate .

Based on previous studies, we have developed a hypothesis:

There is a reverse relationship between acidity and bicarbonate in soil and plant agriculture ,the lower the acidity and the amount of bicarbonates in the soil, the higher the growth of plants.

### 3- Materials and Methods

In the beginning, we investigated about the soil acidity, the amount of bicarbonates in it, their color and their effect on plant cultivation in the soil. We took measurements on different types of soil from different regions in Saudi Arabia and we recorded measurements at 199 secondary School in Riyadh, Saudi Arabia.



During the period of (August 2021 to March 2022) and we noticed the relationship between acidity in the soil and the amount of bicarbonate and the rate of growth of plants in those types of soil, To take measurements We used the digital soil pH meter instrument to measure ph (ph Protocol) (Figure1)



Figure (1) Digital soil pH meter

We used vinegar to measure the amount of bicarbonate in the soil (bicarbonate quantity protocol) (Figure 2).



(Figure 2) How to measure the amount of bicarbonate.

We used the Soil Color Book, a book to learn the numbers of the soil color. (soil color protocol) (Figure3).



Figure (3): Book of soil colors

#### 4- Data summery

##### Globe measurements of acidity

Ph	Region name
6.4	Alnofod
6.6	Al-Qassim
8.3	Al-Muzahmiya
8.1	Al - Mashaala
7.1	199 secondary School
8.4	School 73

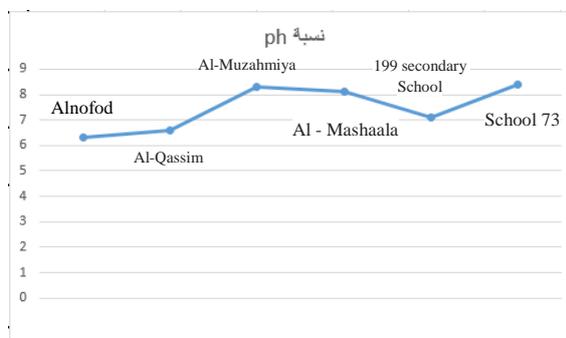


Figure 4: The values of PH of the soil (measurements of the amount of bicarbonate of the soil)

Carbonates	Region name
slight	Alnofod
slight	Al-Qassim
strong	Al-Muzahmiya
strong	Al - Mashaala
none	Arqa High School
strong	School 73

Figure 5: Amount of soil Carbonates (soil color measurements)

Soil color	Latitude and longitude	Region name
2.54.R 4\8	24.21'14.7" N, 46.02'21.9" E	Alnofod
54R 4\6	26.11'15.9" N, 44.14'56.4" E	Al-Qassim
2.54R 5\6	24.26'52.8" N, 46.14'15.5" E	Al-Muzahmiya
2.54R 4\8	24.30'18.0" N, 46.01.00.4" E	Al - Mashaala
54R 5\8	24.690306" N, 46.602502" E	Arqa High School
104R 5\5	24.36'29.5" N, 46.42'02.2" E	School 73

Figure 6: Soil colors

## 5- Analysis and results

From the graphs and experiments , we conclude that the relationship between the acidity of the soil and the amount of bicarbonates in the soil and cultivation is an "inverse relationship", because the higher the acidity in the soil was the soil was not suitable for cultivation and vice versa, and the higher the amount of bicarbonates in the soil The soil was not suitable for cultivation and vice versa through the measurements resulting from experiments on many soil samples from different regions of Saudi Arabia (Figure 7).



Figure 7: Soil samples in various regions of Saudi Arabia

As we all know. There is a relationship between the acidity of the soil and the amount of bicarbonate in it and the growth of vegetation cover on it when we conducted the experiment, we noticed that if the soil acidity is high, the area is weak in the vegetation and the area is difficult to live and is not suitable for agriculture and must be fertilized to give it the missing elements. In addition, sand is spread in highly saline areas, where salinity is high, sodium ions are high deforestation increased, and to reclaim it, organic fertilizer and clay must be added to be cultivable fertile land (figure 8).



Figure 8: The experience of pH measurement of soil (from experiments we conclude that the soil types are acidic or alkaline (figure 9).

Kind of soil	Region name
acid soil	Alnofod
acid soil	Al-Qassim
Alkaline soil	Al-Muzahmiya
Alkaline soil	Al - Mashaala
Neutral soil	Arqa High School
Alkaline soil	School 73

(Figure 9).

When we conducted the second experiment we noticed that if the amount of bicarbonate (alkaline in the soil is high the area is weak the vegetation and the area is difficult to live and is not suitable for agriculture and must be fertilized because the proportion)

Sodium bicarbonate is high in which to give it the missing elements it is possible to add sand to lighten its pores to facilitate water riot (Figure 10).



Figure 10: The experience of measuring the soil alkaline protocol.

When we conducted the third experiment we observed the different soil colors (Figure 11).



Figure 11: Soil color experience

## 6- Conclusions

In this research, we found the relationship between acidity of the soil and the amount of bicarbonates in the soil (alkalinity) and , it is cultivation is an inverse relationship to the soil and acidity and how they differ in each region, we conclude that the relationship is an inverse relationship between them, this study contributes significantly in the development and improvement of the level of agriculture in our region Saudi Arabia and emphasizes the importance of reducing acidity and alkalinity in the soil for an excellent crop.

In conclusion, we recommend that:

- 2- Further studies of high and developed level are carried out on the acidity of the soil and its impact on agricultural crops.
- 3- The need to monitor the amount of acidity in the soil to identify changes in the soil and, it is fertility.

- 4- The need to monitor the amount of bicarbonates in the soil to determine their impact on the cultivation of the earth.
- 5- Conducting researches and experiments on the best percentages of acidity in the soil PH.

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## Badges

Communicate with a specialist	Engineering Solutions	cooperation
<p>We contact with Globe coordination T. Tamader albalawi for selecting this topic, Computer teacher Najlia for helping us in logo design and T.Nada and the T.Noora Al-Subaie for their contribution on writing a research paper</p>	<p>We analyzed all the data obtained from the engineering analysis by Excel and explained it graphically</p>	<p>Jana, Joud, Rand collaborating to gather and input data on the Globe site for six months, we divided the work to get the most accurate information and conduct experiments to measure soil acidity, Their colors on different types of soil from multiple regions of Saudi Arabia and its impact on the cultivation of plants and how to reclaim those species.</p>

