

# Soil characteristics and their effect on the quality of red onion plant in Al Zulfi Governorate

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## Abstract

This research aims at establishing the relationship between the quality of red onion plants in Al-Zulfi city, Saudi Arabia and soil type. Mineral, particularly acidity, salinity and conductivity on bulb quality which is the most vital part of the plant is assessed and most important for the farmer, with the intention of finding out the correlation between the physical disposition of the soil and the quality of the red onion plant. The main research question is therefore based on investigating how differential properties of the soil impact on the growth and quality of red onion plant. The study goals are focused on the contrast of the two regions which have the similar water quality but different types of the ground, Area 1 and Area 2.

## Research Questions

How different is nutrient uptake and growth among various pH levels in the plant of red onion?  
How does the oscillation in soil salinity affect growth performance and physiological health in red onion plants?  
How does soil conductivity influence the growth, yield, and overall quality of red onion plants in relation to their size and nutrient uptake?  
How are the development and quality of red onion plants affected by the combined effects of soil pH, salinity, and electrical conductivity?  
Which might be the best management practice indicated in order to reduce negative impacts of different soil types on the red onion plant crop?

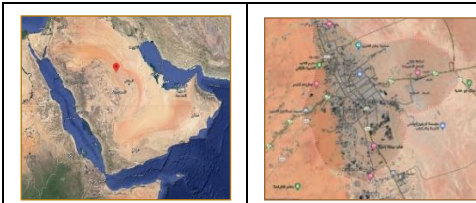
## Introduction

Red onion plant production has always been one of the major agricultural activities engaged within the Al-Zulfi region of Saudi Arabia for the reason that onions are part of the staple diet; therefore, they have been commanding a high economic value in the locality. However, under such conditions, it is hard to achieve full development and realize the potential for quality and yield in red onions due to limiting factors that relate to soil salinity, pH, organic matter, and soil texture. Such an understanding of factors affecting soil would be very crucial in influencing the growth and quality of red onions under arid climatic conditions, challenges, and poor quality of any agricultural undertaking on it.

## Research Methods

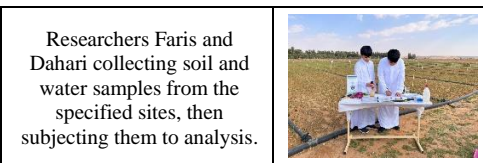
### 9.1 Analysis of the Investigation Site and Climate

This research was conducted in Al-Zulfi Governorate, which belongs to the Riyadh Region of the Kingdom of Saudi Arabia. It is a semi-arid to desert climate region (Latitude 26.267044, Longitude 44.771327), influencing substantially the growth of crops and farming methods in the region



Saudi Arabian Kingdom      The research location

9.1.1 Overview of the Climate  
9.1.2 The Protocol on Water and Land Cover (Water protocol-Land Cover Protocol)  
9.2 Data Collection and Analysis  
9.2.1 Methods of Data Collection  
9.2.1.1 Selection of research Areas  
9.2.1.2 Sampling and Analysis  
Careful attention was paid to the gathering of soil and water samples from the appropriate locations. They were then put through a complex analytical procedure wherein specialized Globe tools were used to evaluate acidity, salinity, and conductivity. These are required to be precise for any evaluation and comparison of the soils' quality to be done correctly.



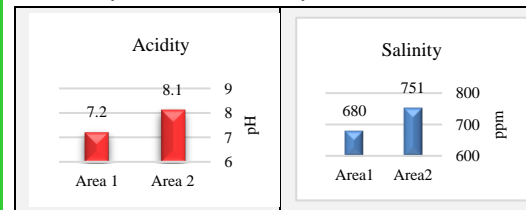
9.2.1.3 Observations of the Red Onion Plants  
9.2.1.4 Standardized Organic Fertilization  
9.2.1.5 Complementary Comparison of onions Quality  
Due to careful observation, comprehensive comparison of the quality by red onion plant formed in the two examination areas was done in December during the step of maturity. Because the onions were directly compared depending on the soil type difference through factors such as size and integrity of red onion plant.

## Results

Using GLOBE devices to analyse water properties-particularly fluorescent water-reveals significant characteristics that are crucial for defining the environmental context. Soil Characteristics Data in the Two Regions

	Characteristics	Area1	Area2
Second: Soil Characteristics data in the two regions:	Acidity (pH)	7.2	8.1
	Salinity (ppm)	680	751
	Conductivity (µs/cm)	962	1064

Values are very indicative of a clear distinction between the two regions on soil properties. Area 1 has a relatively lower salinity and electrical conductivity value, along with a slightly acidic soil type, whereas Area 2 is characterized by a soil type which is slightly alkaline with higher electrical conductivity and increased salinity level.





### Area 1 (Farm 1)

■ **Appearance:** We noted a very remarkable crop of red onion in Area 1. onions looked bigger in size and had better growth when compared to the onions harvested in Area 2.

### Area 2 (Farm 2)

● **Appearance:** It was noted that the red onion plants in the monitored Area 2 were smaller in size and weaker in structure. Therefore, we conclude from this observation that the red onion plant was affected by the nature of the soil in Area 2, as this appeared clearly in the small size of the onion compared to the plants in Area 1.

Area	Area 1	Area 1
A sample from each site was taken to measure the bulb diameter of each plant		

The shows the diameter of some samples of red onion (bulb) measured in centimeters in both Area1 and Area2. The average measurement of these samples selected from each region shows large differences in (bulb) size between the two sites.

## Discussion

The thorough examination of the gathered data has produced remarkable insights into the complex relationship between soil characteristics and the quality of red onion plant as a result. A strong correlation has been revealed by the thorough data analysis, which is best illustrated in Table 2, between variations in soil pH and the ensuing effects on the quality of the red onion plants. These results highlight the crucial role that soil pH plays in shaping the properties of red onion plants, which is particularly apparent given the different conditions that were found at Area 1 and Area 2.

## Conclusions

quality showed that soil pH, salinity, and electrical conductivity have very important effects on the growth and yield of red onion plants. A lower soil pH increases water and nutrient uptake, resulting in enhanced growth and larger bulb sizes. On the other hand, higher soil pH results in poor health of the plant and decreased root absorption capacity. The study, therefore, emphasizes the need for soil assessment prior to cultivation in order to optimize the conditions for red onion production. This will give farmers the opportunity to make informed decisions concerning amendments and cultivation techniques that will ensure quality and better yields of the crop.

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