Sultanate of Oman
Ministry of Education
Al Dhahirah Governorate
schoolSouda, mother of the faithful

Study of the reasons for the lack of ripening of lemon fruits in the Al-Maamoura area in Ibri

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Sultanate of Oman - Al Dhahirah Governorate - Wilayat of Ibri

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Abstract

This research aims to study the reasons for the lack of ripening of lemon fruits. The research questions were as follows:

* What are the reasons for the lack of ripening of lemon fruits in the Al-Maamoura area in Ibri?

* What are the external factors that affect the lack of ripening of lemon tree fruits in the Al-Maamoura area in Ibri?

* Is there any difference in soil properties between Al-Maamoura and Al-Basra? Explain the reason.

* What are types of soil in both areas?

We made a timetable for the work. So, we started with the field visits of the study site that we had chosen. We examined the area and recorded everything surrounding it and the factors affecting it, and we took some of soil samples. Then, in Al-Maamoura area; we went to the source of the water that waters it, and we found a well, it was a certain distance from the farm. After that, we went to Al-Basra and we check the farm. In Al-Maamoura, we recorded the surrounding factors and we took samples of the soil and water that irrigated it. We searched for the source of that water and we discovered that it was a well water. After that, we went to the school laboratory and we applied the soil and water protocols for the two areas (Al-Maamoura and Al-Basra).

We noticed that salinity and acidity significantly affect the two regions. After that, we conducted interviews with farmers to find out other reasons that have an impact. The farmers agreed that the lack of water sources in the farms is the most important reason that caused the lemon tree fruits not to ripen, as lemons need large amounts of water to saturate their soil and bear fruit. This is the main reason for the plant's fruits not to ripen, as the second region has a water source next to it. It waters it daily in large quantities; benefited from a study conducted by Umm Al-Hakam School, entitled: Study of the Reasons for the lack of flowering of mangos tree. One of the most important recommendations that must be made is to find another source of water in the Al-Khadra area, so that the farms can be watered in sufficient quantities to ripen.

Key Terms

Maturity: The stage of growth in which the fruits are fully developed and ready for picking, so that they can continue to perform their various physiological functions without the need to be on the trees; and this is after the fruits reach their natural sizes and take their final shapes.

Field visits: It is a method that gives participants the opportunity to move away from monotony and repetition for a period of time and gain new experiences and ideas. The visit could be to a factory, farm, company, government institution, or other practical experiences that enrich the learning process and maximize its returns.

Research Questions

* What are the reasons for the lack of ripening of lemon fruits in the Al-Maamoura area in Ibri?

* What are the external factors that affect the lack of ripening of lemon tree fruits in the Al-Maamoura area in Ibri?

* Is there any difference in soil properties between Al-Maamoura and Al-Basra? Explain the reason.

* What are types of soil in both areas?

Through the previous questions, we will begin our research and employ all the data, discuss the results, and answer every question we asked previously to discover the factors that affected the lack of maturity of the lemon plant in Al-Maamoura region. This is after comparing it to another area located in the same town.

Introduction and Literature Review

The people of Al Maamoura village are suffering when planting a lemon tree. It grows and bears fruit, but it does not ripen, and sometimes the plant dies while it is still young.

Lemon is a sour fruit that Oman is famous for. It has great benefits and contains vitamin C. It is used in food and salads.

Our aim is to investigate the climatic factors that affecting the ripening of lemon trees in the Al-Khadari area in the farms of the Wilayat of Dhank, despite their ripening in all the villages of the region.

We also aim to identify the reasons for the lack of ripening of lemon fruits in the Al-Maamoura, and to identify the characteristics of the soil and compare these characteristics with the characteristics of an area characterized by the maturity of this tree and we identify the type of soil (clay or sand) and its relationship to maturity, by applying water and soil protocol.

Research methods

First: Research plan

At the first, we thought about our town, is there any problem that the people of the area are suffering from? So, we asked some questions to some of the students and we discovered that the people are suffering from the problem of the lemon tree not ripening in a certain area, which is AlMaamoura. Then, we interviewed the locals to determine the reasons for this. After that, we divided the team into two groups and searched for the area where lemons ripen. Then, we discovered that it is Al-Basra area. So, one group went to that area to study it and the other group went to the targeted study site. So, we explored the area and took samples of the soil from the two sites, and samples of the water that is irrigated for that farm in both sites, and we took the samples to the school laboratory to apply the soil and water protocol to discover the reasons for the lack of ripening and to know the type of soil in both sites and whether it is one of the reasons that prevents the ripening of the fruits on the farm and the degree of salinity and acidity of the water and soil. After recording the data by the team members, we went to the two sites and studied the external factors that surrounding the sites; to discover other reasons that may have prevented the ripening of the fruits. We searched for the water source that irrigates the two areas and the amount of water that irrigates the crops and the height of the two sites above sea level for the possibility of being affected by the height and the period of sunrise to sunset; for the possibility of being affected by the amount of light absorbed by the crops. Then, we searched for different references to discover other reasons that could prevent the lemon tree from ripening.

Objectives to be implemented	Time period
Choosing a research topic	September
Collecting information related to the research	October and November
Field visits to the research site and other sites and conduct soil and water protocols.	December and January
Extracting and writing results and recommendations	January
Research review and final output	February
Research poster design	February
Submit your search	1-March

Research timetable with proposed timeline: Table (1)

Distributing work roles to the research team, represented in preparing tools and field application.

Implementing students	the job
Aya and Liyan	Clearly formulate the research problem and identify and prepare the required tools.
Aya and Liyan	Drawing conclusions from the collected data and then formulating the abstract and writing the research.
Aya and Liyan	Drawing conclusions from the collected data and then formulating the abstract and writing the research.

Distribution of roles on the research team: Table (2)

Second: Study site

(Al Dhahirah Governorate-Ibri-The village of Driz)

Al-Basra area and Al-Maamoura area

Study location: Al-Basra farm

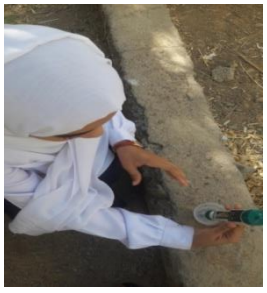
Study location: Al-Maamoura farm

Study site (Al-Dhuwairiyah and Al-Dhuwairiyah regions) and the vegetables

Third: Data collection and analysis

At the first, we determined the work of each student in the team and the role she will play, through a schedule that specifies the work for each student and the protocols that will be implemented later. Through the following steps:

1) Water protocol application: Two samples were taken and tested using acidity, conductivity and salinity device, and then the average of the two samples was taken.
2) Comparing the acidity of water in Al-Basra and Al-Maamoura areas and knowing the amount of change in it through samples taken from each area.
3) Comparing the type of each soil by applying the soil protocol and its ability to absorb water.



Pictures (1) (2) (3) Applying the water

4) Create a table to compare all of the above and graphs to see how much water acidity, soil water absorption capacity, and soil acidity affect lemon fruit ripening.
5) By studying the site, external factors surrounding the study area became clear, through which we will reach recommendations to solve this problem and try to get rid of it.
6) All protocol and study site data were then recorded on the program website and copied as follows:

Photos (4), (5) and (6) of the application of the soil protocol to the two villages

From the data of soil, it became clear that it is characterized by the following:

Soil Protocol Data in Al-Maamoura

- Granular soil with roots, high carbon content, and many small rocks.

- Coarse, slightly alkaline, granular soil.

After collecting data from this protocol, we obtained the following data:

Water Protocol Data in Al Maamoura

- The pH of the water is ok.

- The water source comes from a well which is not far away, and the farm provides it with sufficient water.

Through the soil data, it became clear that it is characterized by the following:

Soil Protocol Data in Al-Basra

- Gravely soil with no roots, low carbon content and few small rocks.

- Hard, gravelly soil with high alkalinity.

After collecting the data of this protocol, we obtained the following data:

Al-Basra Water Protocol Data

- The pH of the water is ok.

- The water source comes from a well and is far away from the farm, so it cannot deliver enough water.

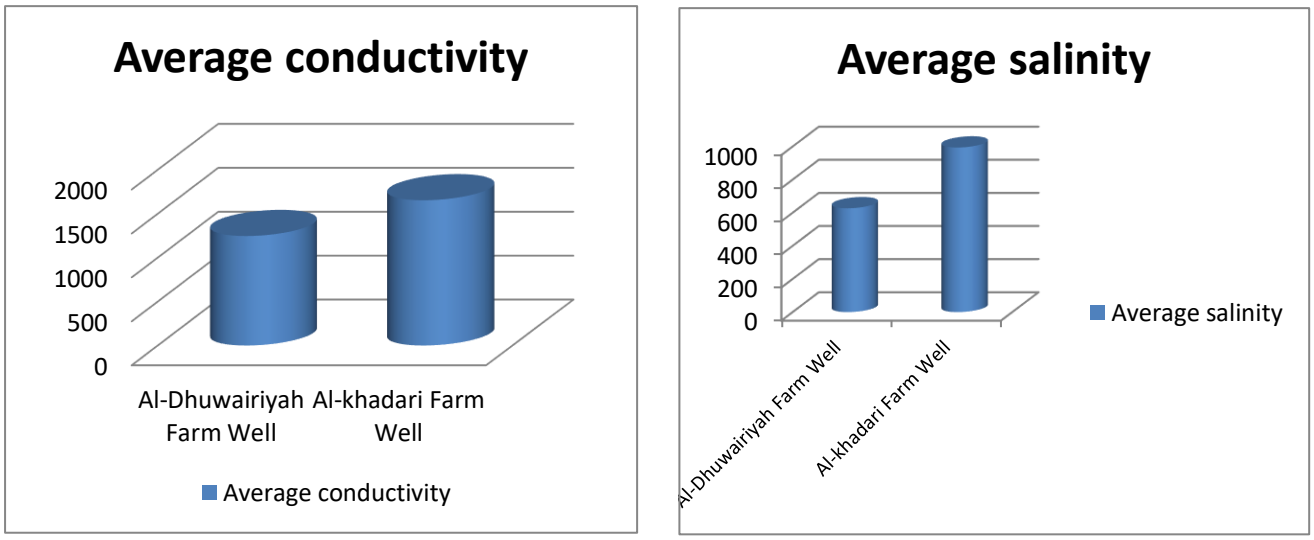
Average temperature	Phmiddle	Average salinity	Average conductivity	Comparison point
24	8.45	927	1246	Al-Basra farm well
18	8.46	994	1653	Al-Maamoura well

Table (3) Comparison between the water of Al-Basra well and the water of Al-Maamoura well

Results

By applying the water and soil protocol to the study site (Al Maamoura) and another comparison site (Al-Basra), pictures were taken of how the data was collected as follows:

Data were obtained through salinity, conductivity and acidity of water in Al-Maamoura and Al-Basra, as follows:



Figure(1) Salinity and conductivity data for the two water samples (1: Al-Maamoura area, 2: Al-Basra area)

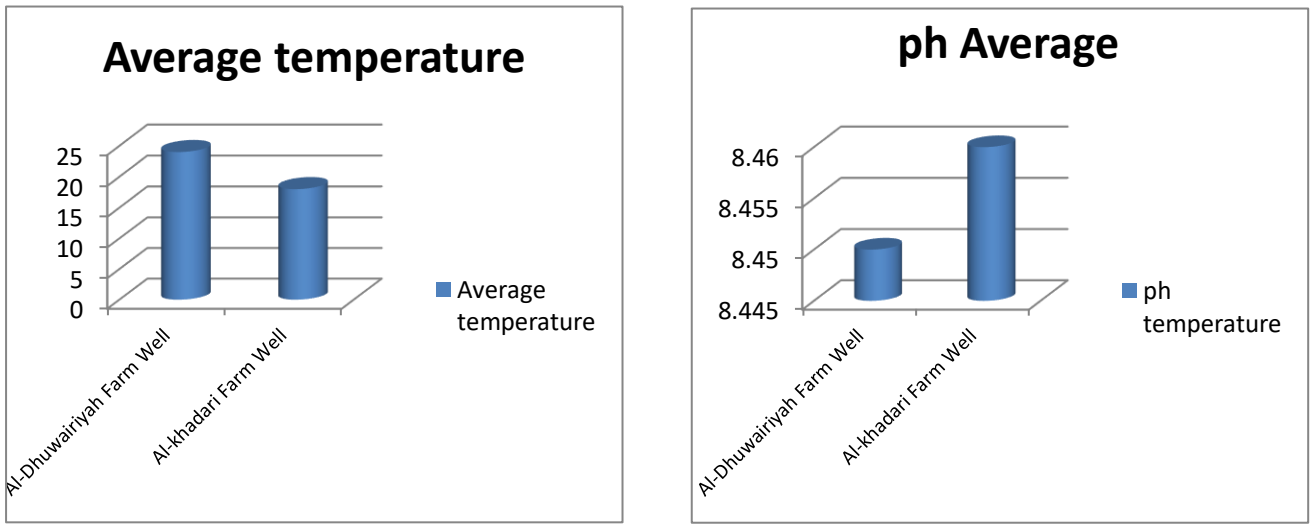
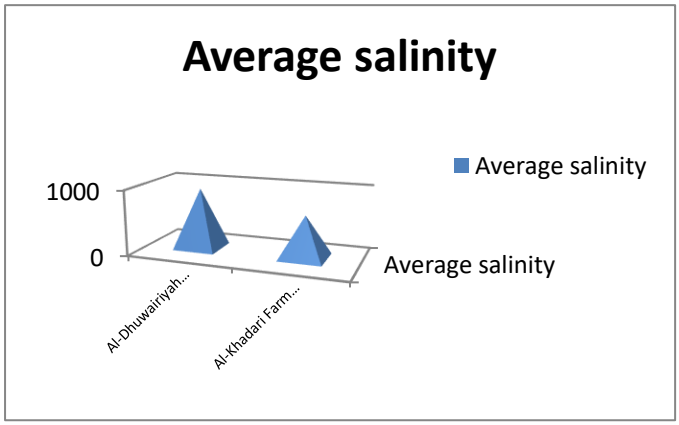


Figure (2) Acidity and temperature data for the two water samples (1: Al-Basra area ,2: Al-Maamoura area)

Acidity (PH)	Salinity	amount of carbon	amount of rocks	amount of roots	conductivity	Comparison point

8.35	931	slim	Few	Many	945	**Al-Basra farm soil**
8.33	642	Many	Many	Few	652	**Al-Maamoura farm soil**

The data were obtained through the salinity, conductivity and acidity of the soil of Al-Dhuwairiyah Farm and Al-Khadhri Farm soil, as follows:



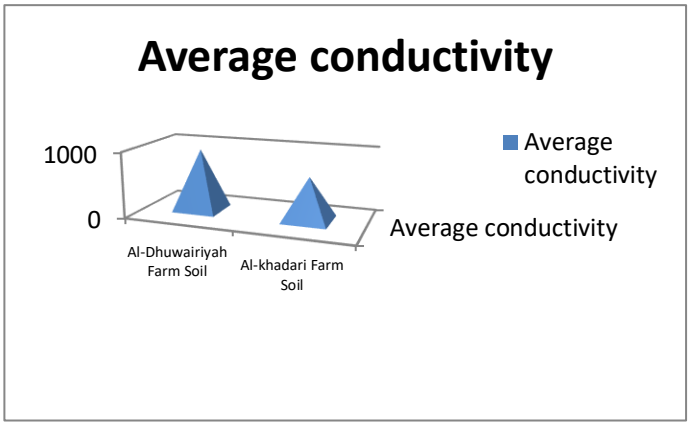
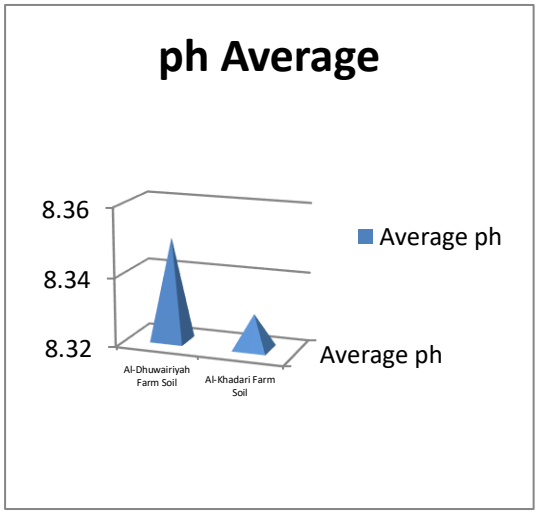


Chart (3) shows the conductivity and salinity data for the two soils

(1: Al-Basra area, 2: Al-Maamoura area)



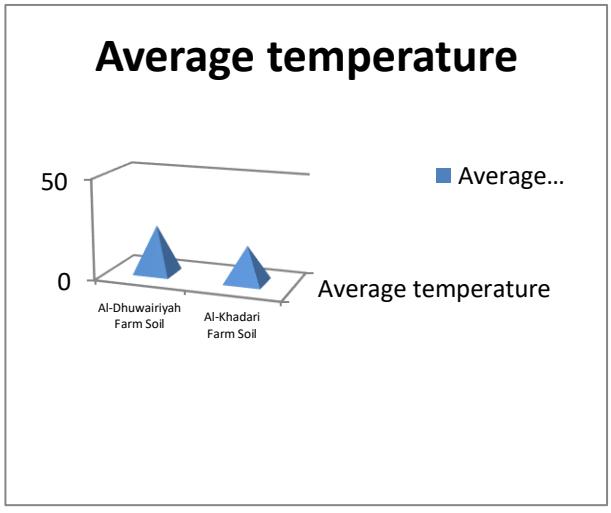
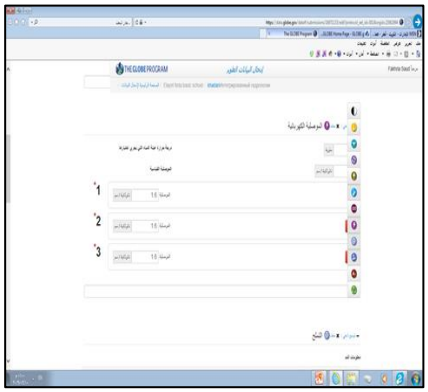
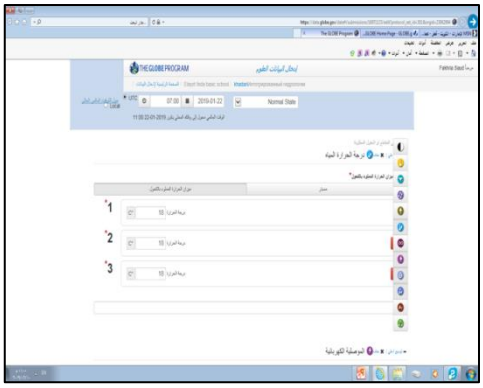


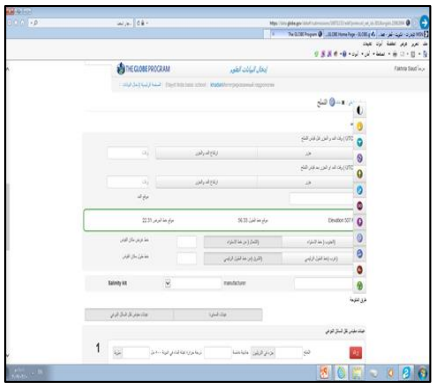
Chart (4) shows the temperature and PH of soil samples

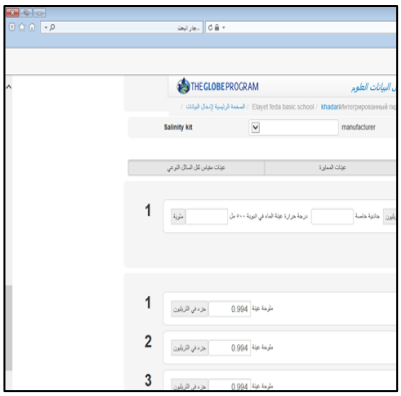
(1: Al-Basra area, 2: Al-Maamoura area)

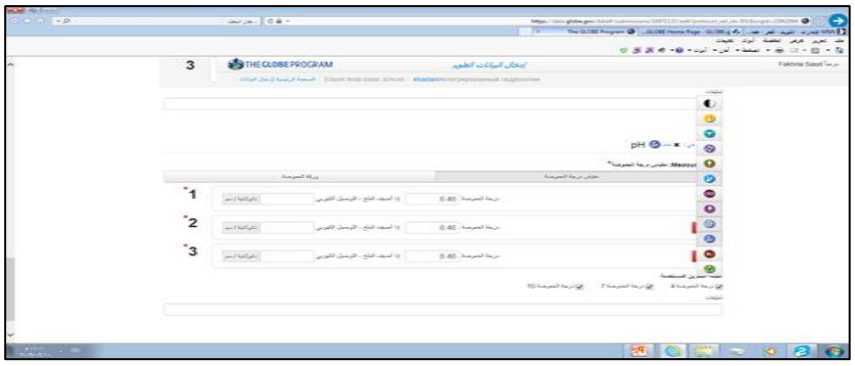
Entering data into the website, where new sites, soil and water data were entered:



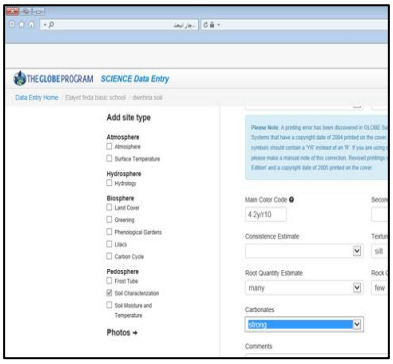


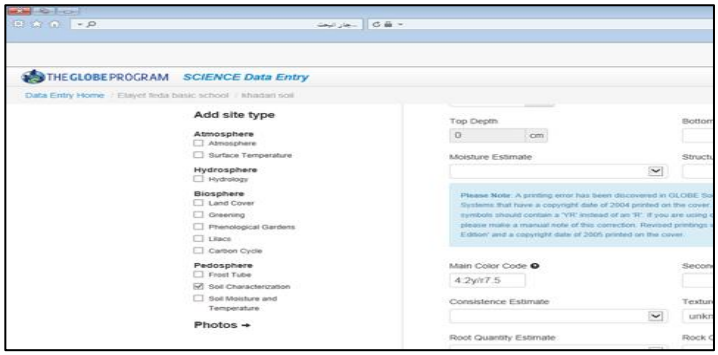






Images (7) (8) (9) (10) (11) Water Protocol Data





Images (12) (13) Soil Protocol Data

Interview with the residents of Al Khadrah

We contacted with some farmers to find out more about if there were external reasons affecting lemon ripening in Al-Maamoura area. We recorded these reasons:

- The quantity of water that used to irrigate the crops is very small.
- The farm is far away from the water source which is irrigated it.
- The area is high above sea level.
- The sun rises late and sets early. It sets at 4:30.

Discussion

Through the results we have reached, it became clear to us that the salinity and conductivity of water in the Al-Maamoura area is high and transparent compared to Al-Basra water. After research and scrutiny, it became clear through studies that water salinity negatively affects soil fertility and its ability to mature, but the results of the research were opposite. We discovered that Al-Basra soil is more fertile and clayey to a depth of two meters. So it retains water and lemon trees grow abundantly in it.

Then, we found out that there is a slight difference in soil salinity in Al-Maamoura and Al-Basra. which indicates that the salinity of the water is higher in the region. Despite the difference in soil quality in Al-Maamoura, the soil is clayey, with low water permeability, and is gravelly at a depth of two meters. (Agricultural Development Office in Ibri). It requires very large quantities and absorbs large quantities.

From the water, we conclude from the data that the type of soil affects the ripening of lemon fruits. Then, we learn about the external reasons that help the lemon fruits ripen, including the amount of water that is irrigated with crops. The more water, the more fertile of soil. We reached the external factors affecting the ripening of lemon fruits by interviewing one of the farmers. He explained to us that the amount of water is the main reason, as everyone has agreed on this since ancient times due to the scarcity of water in the region. The lemon fruits and their ability to achieve an economic crop are affected if the height of the site of their cultivation exceeds600 meters above sea level, where in these cases it suffers from poor ripening, lack of thermal requirements for the growth and ripening of its fruits, and lack of access to large amounts of light. This is also one of the factors that actually affect the emergence of the problem we are studying.

Conclusion

In this research, we tried to identify the reasons for the lack of maturity of lemon trees in the Al Maamoura farms. We conducted a practical experiment (examining two samples of water and soil from Al-Maamoura and Al-Basra areas) and made field visits.

We have reached:

External factors such as the amount of water consumed when irrigating crops is most influential factor in the immaturity of lemon plants, as well as the qualities of the water used to irrigate them.

So, we conclude that Al-Basra soil has properties that differ from those in the Khadari area.

- Properties of Al-Basra soil: Clay soil with marked alkalinity.

- Properties of Al-Basra water: Moderate alkalinity and low salinity.

- Properties of Al-Maamoura soil: Highly saline and highly acidic soil.

- Properties of Al-Maamoura water: Moderate alkalinity and high salinity.

We can apply the search again; So, we bring a sample from Al-Maamoura and Al-Basra soil. Then, we plant it in the school and watching the growth and flowering and add a study of the vegetation protocol.

During these times, all segments of society must work hard and diligently to find solutions to help this tree mature.

We demand the responsible agencies of agricultural development to provide everything that farmer need in that area, and to work on eliminate the problem of scarcity of irrigation water due to the diversity of plants in the amount of water they need to grow.

We also ask the people of that area to create another water source to irrigate the crops, so that the amount of water is large enough for all the trees to absorb the water they need to bear fruit.

We also propose to establish an office affiliated with the Ministry of Agricultural Development in that area. So, any farmer can solve

the troubles on his farm after discussion them with the specialists. They also have to teach the farmers how to use the devices to know the acidity and salinity of the soil to avoid wasting time trying to ripen the plants.

Thanks and appreciation

May the blessings and peace of Allah be upon him and upon all the prophets and messengers. We would like to extend our sincere gratitude to everyone who has contributed to this research:

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We also thank everyone who helped and contributed to providing scientific information related to the research. We thank Al-Maamoura and Al-Basra resedints for the opportunity to examine water and soil samples, and Hamad Saif Al-Alawi for interviewing him as a farmer in Al-Maamoura area.

References

1) Q.Ibrahim-Water crisis in the Arab world, Modern Book House

2) A.Ismael, Abu Al-Fida-Interpretation of the Great Qur'an (Ibn Kathir's Interpretation) (Tayyiba Edition), Good house.

3) a team GLOBE Environmental Scientific Committee of the Central Team, Featured Research Booklet 2018

4) Ministry of Education Science book for the fifth grade - Edition2017\2018.

5) Ministry of Education Science book for the seventh grade - Edition.2017\2018

6) Ministry of Education, Science Book for the Eighth Grade - Edition.2017\2018