Abstract

Four experiments have been done on four selected sites. This was to study water and soil conductivity and its effect on plant growth.

We assumed that:

- Groundwater wells and Seawater desalination affect the growth of plants and fruit.
- Water and soil conductivity affect the PH values in the soil.

The results obtained were summarized as follows:

1- Seawater desalination affected the pH values for the soil more than groundwater wells.

2- Unlike groundwater wells, seawater desalination was one of the reasons leading to the fall of plants leaves.

3- Electrical conductivity of water played a role in the soil ph values.

4- The range of soil ph can greatly affect the growth of plants.

At the end of the study, we recommend the following:

Reducing the use of seawater desalination and replacing it with groundwater wells for irrigation of plants.

The Effect of Soil Salinity and Acidity on The Leaves and Fruit of the berry plant

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Limits of Research

The study was conducted in four geographical locations in the village of Al-Nasba, located in al-Baha city, Saudi Arabia, according to the longitude, latitude and height circles recorded in spreadsheet No (1)

Site 1 and site 2 Mulberry plant was irrigated with groundwater.

Location 3 and site 4 The berry plant was irrigated with red sea desalination water

The study continued between 2019/2020

Questions and Research Hypotheses

The problem:

Why do the leaves and fruits of the irrigated berries fall with desalination water compared to the leaves and fruits of the irrigated berries plant with groundwater wells?

Questions and hypotheses Research:

We assume that groundwater affects soil and the growth of berries and their fruits

- What is the impact of groundwater on the growth of berries and the loss of their leaves and fruits?

We assume that desalination water affects the soil and the growth of the berries plant and its leaves and fruits fall

- What is the extent of the impact of sweetening water on the soil and on the growth of berries and the shedding of its leaves and fruits?

We assume that the conductivity values in water influence the pH values in the soil

- Does water conductivity affect pH values in the soil?

We assume that the conductivity values in the soil affect the growth of the berry plant and the fall of its leaves and fruits

- Do the conductivity values in the soil affect the growth of berries and the loss of their leaves and fruits?

Significance of Research

The importance of the research lies in our knowledge of the water suitable for watering crops in order to obtain a crop with good fruits and leaves that can be used economically. We discovered through our study that groundwater wells are the water best suited for watering berries and that desalination water is not suitable for watering the plant as it increases the pH of the irrigated soil. It increases the values of electrical conductivity of the soil, which results in a decrease in the absorption of nutrients by the plant, causing the leaves and berries of the berries to fall and we measure the rest of the other plants.

Materials and method

We used the following protocols to study the submitted research: •

- GPS
- Ph Protocol
- Water Electric Conductivity Protocol
- Soil Electrical Conductivity Protocol

GPS

Steps to determine the coordinates:

- The Gregorian date and the name of the study site are recorded and the source of the data is specified in the data form.
- The device starts at the study site, ensuring that it is held vertically and that there is no barrier between the antenna of the device and the sky.
- The device starts looking for satellites.
- The device is waiting until the device indicates at least four satellites.
- By seeing "D-3" on the screen.
- Within a period of one minute and without moving the device for more than one meter, three readings are taken and recorded in the relevant table in the data form (each reading should include: latitude, latitude, altitude).
- Calculates the rate of measurements for latitude, longitude, and altitude and is recorded in the data form.

Ph protocol

Steps to work using the meter pH :

- pour 30 ml of water sample into a clean and dry cup enough to immerse the electrode of the scale.
- Remove the gauge cap and rinse the electrode and the surrounding area with distilled water using a pressure flask, and then dry with a soft cleaning cloth.
- Press the power switch and then immerse the electrode of the scale in the soil sample irrigated with desalinated water.
- Move the water in the cup once, then record the meter reading after it settles.
- Repeat on the remaining two cups.
- Calculates the rate of the three readings.
- The pH of the water is recorded in the data form.
- Remove the meter from the water and press the power switch to turn it off, rinse the electrode and the surrounding area with distilled water twice using a pressure flask, and then dry with a clean cleaning paper and re-cover it.
- The previous steps are then returned with the soil irrigated with well water.

Water Electrical conductivity protocol

Measurements of electrical conductivity of water:

- Wear rubber gloves.
- Water temperature is measured at the water search site, if the temperature is between 20 - 30 ° the water temperature is recorded in the data form.
- If the water temperature is less than 20 ° C or higher than 30 ° C, the plastic bottle (633-633 ml) is packed with the water to be measured, the bottle is covered and the sample is transferred to the school's Globe Room and water is left until it reaches 20-30 ° C Data form Wash the cups twice with the sample water.
- Pour about 50 ml of water to be measured in each cup.
- Remove the gauge cover and press the ON / OFF button.
- Wash the electrode at the bottom of the meter with distilled water and then gently dry the electrode with napkins, keeping in mind that it is not scratched. - Place the pole in the first cup and gently stir for several seconds, keeping the meter flat in the bottom of the container or touching the sides of the cup.
- Remove the meter from the first cup and stir gently to remove the water from it and then put in the second cup without washing it with distilled water.
- Leave the pole immersed in water for at least a minute and when the reading is constant, the value is recorded in the data form in the first sample box.
- Repeats the measurement from two other observers using new quantities of water sample each time and records are recorded in the data form in the second and third sample.
- Press the stop button, wash the pole with distilled water, dry and put the lid on it, wash the cups and the sample bottle.

Soil Electrical Conductivity Protocol

- **Steps to measure the electrical conductivity of the soil:**

- Wear rubber gloves.
- We take the soil sample near the roots of the berries plant, whether the plant is irrigated with desalination water or groundwater
- Mix the soil with distilled water by ratio of one part of the soil to five parts of distilled water and shake it well
- Allow the mixture to settle for at least two minutes
- You may be required to let the mixture settle for thirty minutesRemove the gauge cover and press the ON / OFF button.
- The electrode at the bottom of the scale is washed with distilled water and then gently dried with a tissue, taking care not to scratch it
- Dip the conductivity meter to the required level
- The electrode is left immersed in the water for a period of not less than a minute, and when reading it, the value is recorded in the data form in the first sample field
- The measurement is repeated by other observers, using new quantities of water sample each time. Readings are recorded in the data form in the second and third sample field.
- The stop button is pressed, the electrode is washed with distilled water, dried, the cap is placed on it, and the cup and sample bottle are washed.

Summary of Data
(Study Sites)

Site number	Sites
1 Irrigated with groundwater	N20°08.801 E041°17.667 2089m
2 Irrigated with groundwater	N20°08.773 E041°17.744 2116m
3 Irrigated with desalination water	N20°09.107 E041°17.398 2096m
4 Irrigated with desalination water	N20°08.921 E041°17.555 2086m

Table 1

Summary of Data

Electrical conductivity values for well water and electrical conductivity values for desalination water

Site number	Electrical Conductivity values for well water	Site number	Electrical Conductivity values of desalinated water
1 Irrigated with groundwater	1501µS/cm	3 Irrigated with desalination water	347µS/cm
2 Irrigated with groundwater	1244µS/cm	4 Irrigated with desalination water	336µS/cm

Table 2

Summary of Data

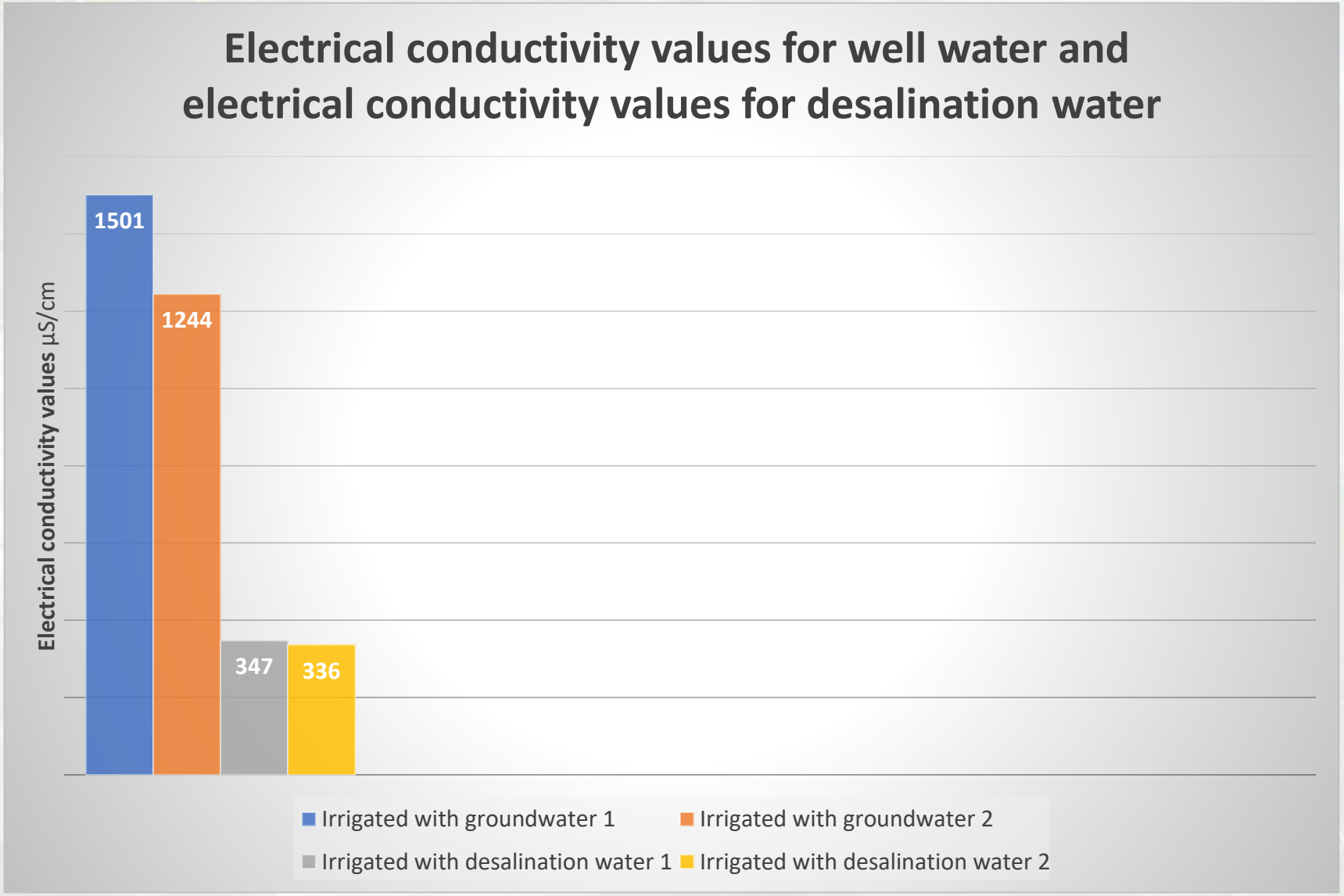

Chart 1

Summary of Data

(pH values of well irrigated soils and ph)values of soil irrigated with desalinated water

Site number	PH values of well irrigated soils	Site number	Ph values of soil irrigated with desalinated water
1	8	3	8.8
2	8.3	4	8.9

Table 3

Summary of Data

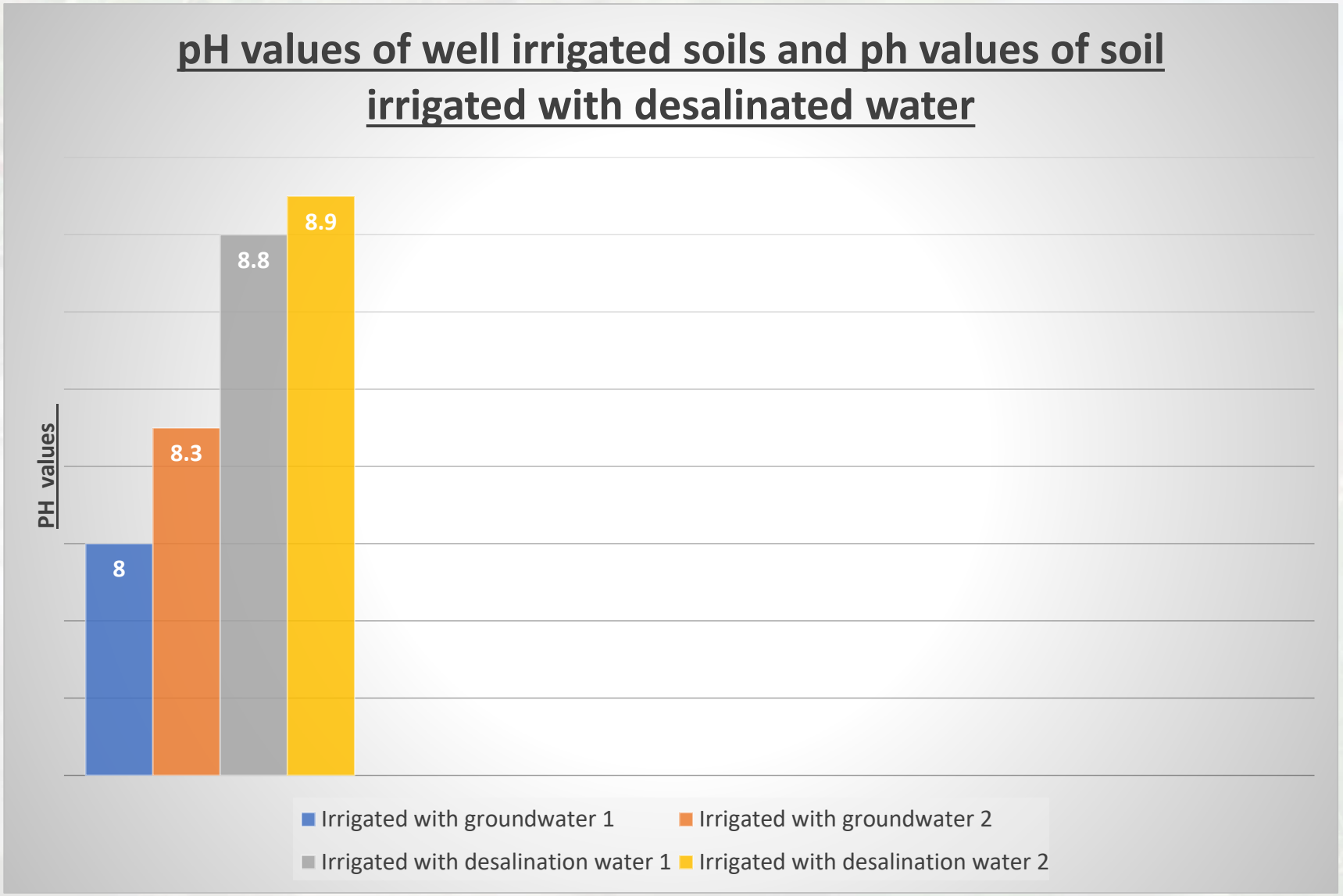

Chart 2

Summary of Data

The relationship between ph values of water-irrigated soil sorority and water conductivity values

Site number	Ph values for soil	Conductivity values
1 Irrigated with groundwater	8	µS/cm 1501
2 Irrigated with groundwater	8.3	µS/cm 1244
3 Irrigated with desalination water	8.8	µS/cm 347
4 Irrigated with desalination water	8.9	µS/cm 336

Table 4

Summary of Data

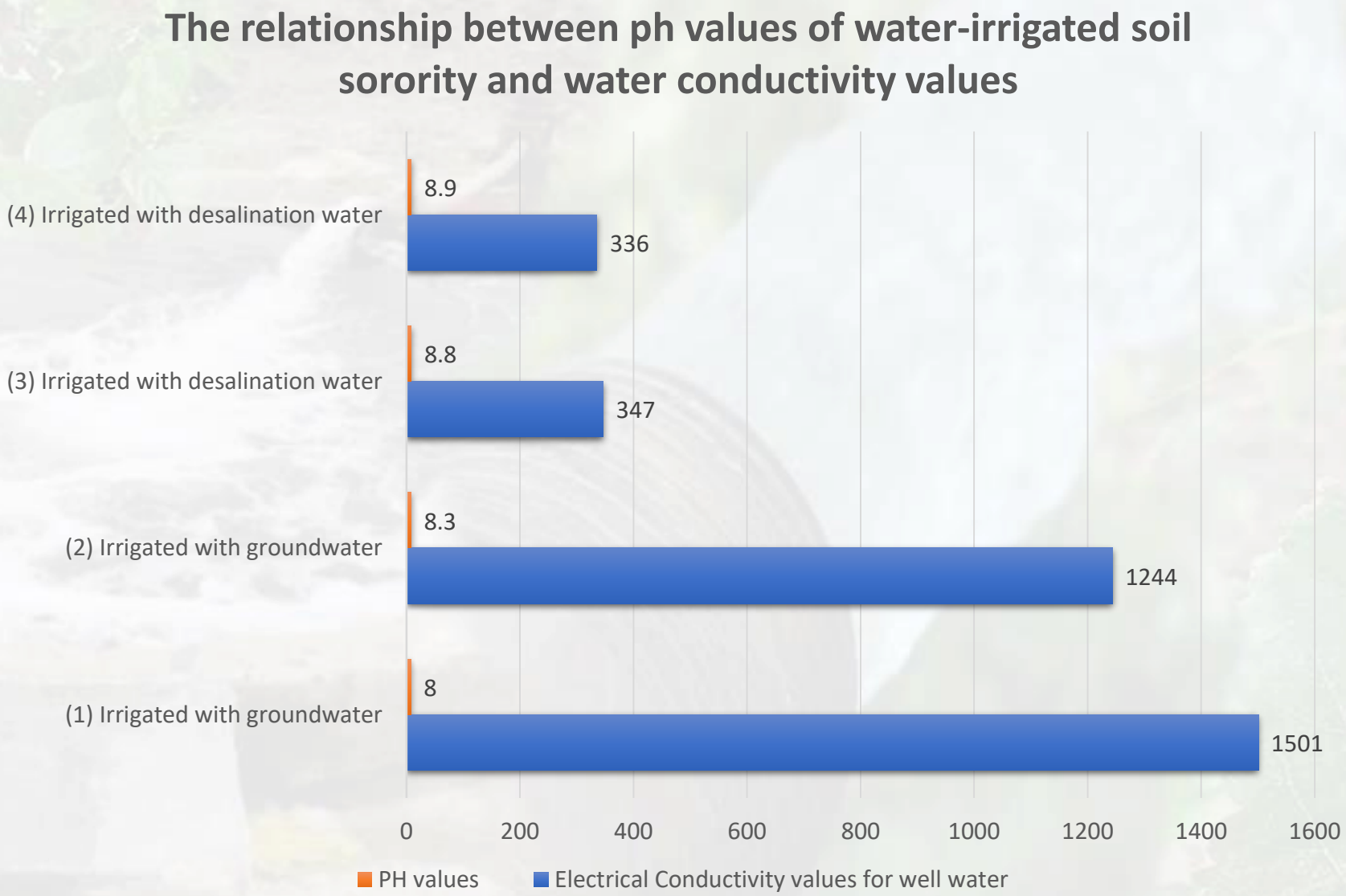

Chart 3

Summary of Data

The conductivity values of irrigated soil with well water and the conductivity values of soil irrigated with desalination water

Site number	The values of conductivity of irrigated soil in well water	Site number	The values of conductivity of soil irrigated with desalination water
1 Irrigated with groundwater	158µS/cm	3 Irrigated with desalination water	268µS/cm
2 Irrigated with groundwater	105µS/cm	4 Irrigated with desalination water	241µS/cm

Table 5

Summary of Data

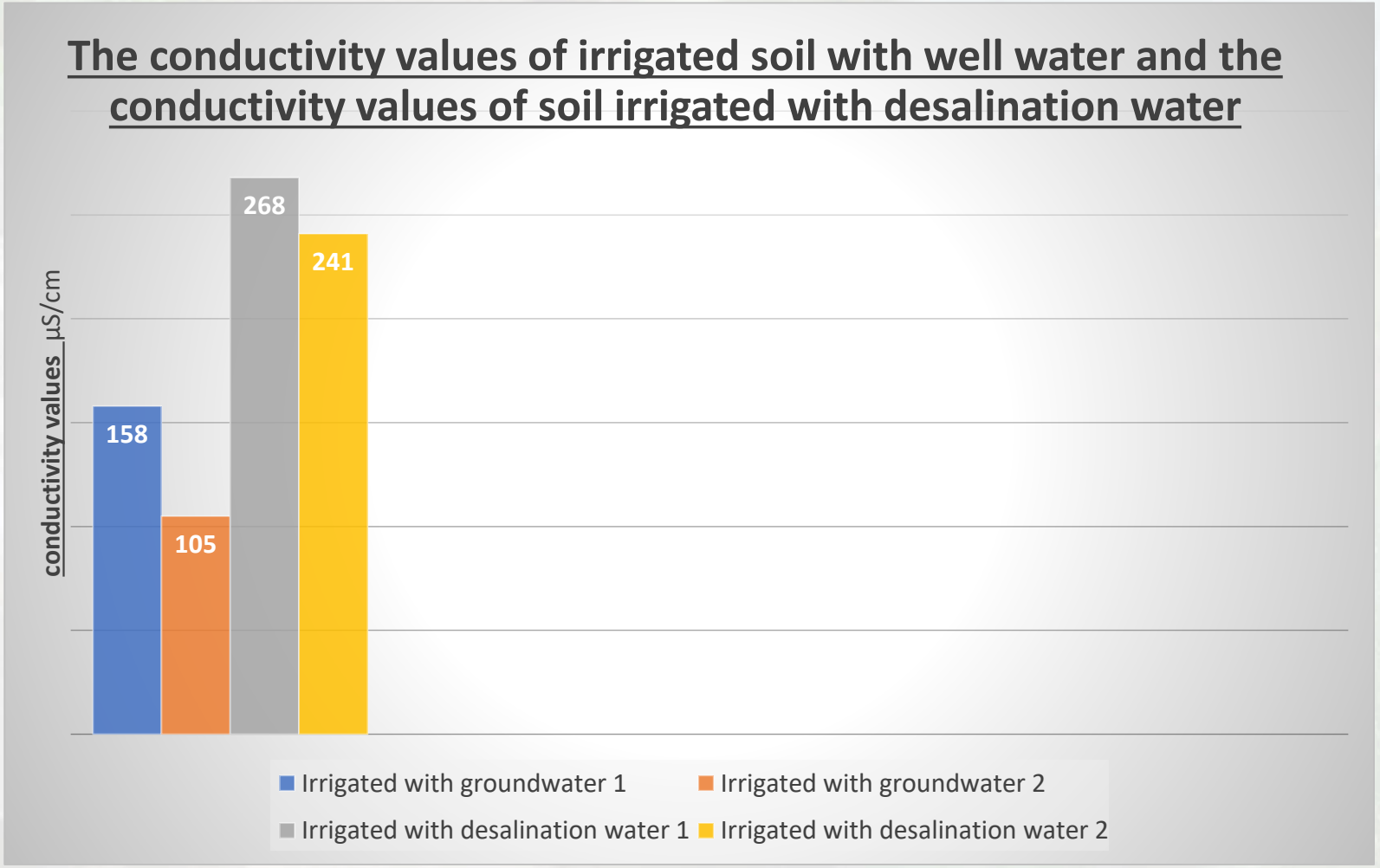

Chart 4

Summary of Data

(A table showing ph values, electrical conductivity, leaf fall and) fruit production in mulberry plant

Site number	Plant type	Ph values for soil	Electrical water conductivity values	Electrical conductivity values for soil	The extent of leaves falling and the production of fruits	Pictures of leaves and fruits
1 Irrigated with groundwater	Mulberry plant	8	1501 µS/cm	158µS/cm	Tree leaves are good in color and shape The fruits grow and continue until maturity	
2 Irrigated with groundwater	Mulberry plant	8.3	1244 µS/cm	105µS/cm	Tree leaves are good in color and shape The fruits grow and continue until maturity	
3 Irrigated with desalination water	Mulberry plant	8.8	347 µS/cm	268µS/cm	Tree leaves are black The fruits grow first and fall down	
4 Irrigated with desalination water	Mulberry plant	8.9	336 µS/cm	241µS/cm	Tree leaves are black The fruits grow first and fall down	

Table 6

Data Analysis :

In Table (1)

soil pH measurements and electrical conductivity measurements for water were taken from 4 different sites.
Site 1, 2 Groundwater Water
3, 4 Desalination Water

Table (2) and Figure (1):

(1) 1501 µS / cm and location (2) 1244 µS / cm and the electrical conductivity values of desalinated water at site (3) 347µS / cm and location (4) 336 µS / cm through

Table (3) and Graph (2):

The pH values of well irrigated soils were noted with ph at location (8) and location (2) 8.3 and the high pH values of the irrigated soils, where they were on site (3) 8.8 and location (4) 8.9

In Table No. (4) and Chart (3):

We note that the pH values decrease as the electrical conductivity of the water increases and vice versa.

In Table No. (5) and Chart (4):

The higher the pH values, the more electrical conductivity of the soil and vice versa.

In Table 6:

It was observed that the mulberry plant with well water has good leaves of color, shape and fruits grows and continues until maturity through the views of those owners of these crops and that the irrigated berries plant with sweet water with spotted leaves and their fruits grow at first and soon fall.

Conclusions

1. Water desalination with seawater affects the pH values of the soil significantly and significantly.

2. Well water irrigation affects soil ph values very little.

3. Desalinated water increased the ph values of irrigated soils as they tended to alkaline compared to ph values of soil irrigated with groundwater that
maintained reasonable levels.

4. Water Desalination was one of the reasons leading to the fall of leaf plants and cracking and weak production of fruits compared to groundwater wells that led to the quality of crops and the production of fruits well.

5. The electrical conductivity of water plays an important role in increasing or decreasing soil pH values

6. The higher the pH values of the soil, the greater the concentration of salts in the soil, causing the leaves of the berries to fall off and sprouting and poor production. Perhaps this is due to the low absorption of nutrients from the soil (salts).

7. The lower the pH values in the soil, the less the concentration of salts in the soil will make the leaves good color, shape and fruits grow and continue until ripening. Perhaps this is due to the increased absorption of nutrients from the soil (salts).

Discussion

- Electrical conductivity plays an important role in the increase or decrease of ph values in the soil affecting the quality of the crop.
- The values of the electrical conductivity of the soil (concentration of salts) affect the fall or quality of the leaves of the berries

- According to previous studies:

1. When the earth is alkaline, the iron hydroxide salts which are not absorbed by the plant are called iron deficiency, and if the pH values in the soil change significantly, this may adversely affect the functions of the members of the plant and the water of desalination may have an impact

2 - of the components needed by the plant Nitrogen and get it from nitrates if the earth alkaline and may be membranes of plant berries is not permeable nitrates, that is, it needs acidic land for its growth and therefore fell leaves and fruits when the increased alkalinity of soil as a result of watering soil water compared to leaves and fruits of bitter mulberry plant Uh wells ..

Recommendations

- The decrease in the use of seawater desalination water and its replacement with groundwater water for irrigation of plants. There were significant changes in pH ratios in irrigated soils and their transformation into highly alkaline soils as well as the leaves and fruits of irrigated plants compared to plants irrigated with groundwater wells.

- Desalination water may contain heavy metal elements resulting from chemical treatment, which is one of the reasons for changing soil acidity, which may take many years to reach the high levels of change observed during the experiments.

Acknowledgments

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Researchers

References

1- Teacher's Guide to GLOBAL ENVIRONMENTAL PROGRAM.

2- El Zahrani, Elham(2017,mar 22). ***Effect of soil irrigation and fertilization on changing the nature and conversion of sandy lands Into arable land.***scientific research,Globe site, Retrieved on 3mar2019.http://cutt.us/zZqpt

3- An-Najah NationalUniversity. (19 Dec 2009).***Use treated gray water to irrigate rainfed olive trees,*** Retrieved on 1 mar 2019. http://cutt.us/pfw0l

4- n.p. (n.d). ***How to measure salinity.*** Retrieved Feb 15 ,2020 from Web site : https://cutt.us/etTx5

5-Dubbin, W. (2001) “Soils” Natural History Museum Press, London

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Useful in the profession of agriculture and agriculture	Provide water networks based on groundwater wells because they are many in my area and replace them for irrigation crops instead of desalinated water (desalinated water) that reach homes now	We benefited from the research of the student Elham Mohamed Maghoud from Asmaa Bint El-Noman High School in Boca Added to Globe's website Presented to the International Virtual Fair of July 2017 under the title Effect of soil irrigation and fertilization on changing the nature and conversion of sandy lands into arable land	Collaborated with the Heart Coordinator and Program Teacher Both are specialized in stem	Groundwater irrigation increases fruit production and crop quality, increasing the economic value of agricultural crops	**Search group**