Globe Environmental Program (Soil Protocol Research)

Effect of soil salinity on the growth of tomato seeds

The ninety–seventh secondary school

Saudi Arabia – Jeddah


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Summary

The soil salinity is one of the most important and most dangerous problems in the world, and it's meant by the accumulation of dissolved salts in the area of root spread, to the extent that impedes the ideal growth of the plant, and the process of salt accumulation on the ground is affected by the water balance, as this water balance is affected by climatic conditions and human activity.

From here originated the problem of this research to know the effect of soil salinity on the growth of tomato seeds, where tomato seeds were used for their rapid growth and because of the importance of tomatoes for the society's food, the independent variable of the experiment was the type of water (fresh water and salt water in different concentrations), and the dependent variable (Tomato seeds) in soil suitable for cultivation, the soil was placed in two different bowls due to the different type of water used, then tomato seeds were placed in the two bowls in equal quantities and under the same conditions in terms of exposure to sunlight and for ventilation, and they were watered with fresh water and salt water in different concentrations daily, and monitor the growth of tomato seeds In the two bowls.

After nine days, the growth of tomato seeds that were watered with fresh water was clearly observed. As for the

tomato seeds that were watered with salt water in different concentrations did not grow, it was concluded that fresh water is effective in the growth of tomato seeds and thus all types of plants, while salt water did not help the growth of tomato seeds, and therefore have negative effects on the soil and the plant.

From practical experience, the researchers recommend measuring the salinity of the water before watering the plants and educating the farmers about watering the agricultural crops with fresh water that helps their growth in a greater and better way and thus increases the quality of agricultural production.

key words

Soil salinity, tomato seeds, fresh water and salt water in different concentrations

Introduction:

The problem of salinization of the soil is considered one of the most important and most dangerous problems in the world, and the salinity of the soil is meant by the occurrence of a quantitative accumulation of dissolved salts in the area of root spread with a high concentration to the extent that impedes the ideal growth of the plant and the transformation of the soil sector into an environment that is not suitable for the spread of the roots, and the dissolved salts usually consist of sodium, calcium, magnesium, chloride and sulfate mainly and from potassium and bicarbonate, nitrates and boron in a secondary way.

And the process of accumulation of salts on the ground is affected by the water balance in the region, and this water balance is also affected by climatic conditions in addition to human activity.

Soil salinity can be defined as the ratio of saline content in the soil, and salinity is the increase in the concentration of salts, such as sodium, chloride and boron, in the area of plant roots. These concentrations reach the extent that affects plant growth and a shortage of the crop symptoms are similar to the symptoms of dehydration due to a deficiency Irrigation such as dry

leaves or the appearance of a dark color or bluish green on them, and the concentration of salts increases in depth as a result of the absorption of water by the plants and leaving the salts in a small amount of the remaining water around the roots of the plant, from here the idea of the current research originated to know the effect of soil salinity on tomato seeds, By watering tomato seeds different concentrations of salt water and note its growth and compare it with another in which watered tomato seeds with fresh water.

Research problem:

Soil salinity and its effect on the growth of tomato seeds.

The main research question:

What is the effect of water type (fresh water, salt water in different concentrations) on the growth of tomato seeds?

Research objective:

Knowing the negative or positive effect of fresh water and salt water in different concentrations on the growth of tomato seeds.

Research Methodology:

Experimental method.

Variables:

Independent variable (water type: fresh water and salt water in different concentrations), dependent variable (tomato seeds), constant variable (amount of soil).

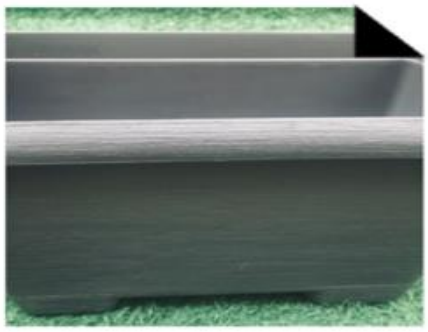
Hypotheses:

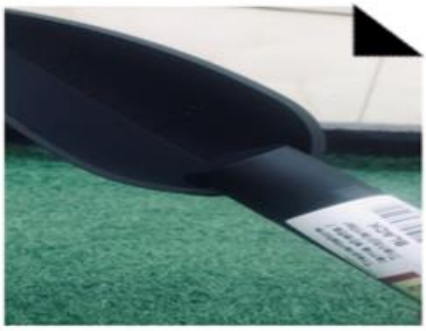
1. Fresh water helps grow tomato seeds.

2. Salt water in different concentrations does not help the growth of tomato seeds.

Experience Tools:

- Two basins for agriculture.
- Soil suitable for cultivation.
- tomato seeds.
- Fresh water sprinkler, salt water sprinkler and shovel





Experience tools

Work steps

1. Placing arable soil in two basins.

2. Place the tomato seeds inside the soil in both basins.

3. Covering the tomato seeds with the soil.

4. Water the first basin with fresh water.

5. Water the second basin with water in different concentrations.

6. Measure the amount of wet and dry soil and the amount of water, and it was

The measurements are as follows:

• Moist soil: 37 grams

• Dry soil: 36 grams

• Water amount: 2 liters

7. Note the color of the soil.

watching:

• Note that the soil color was 10YR 4l4

• The two basins that were watered with fresh water and salt water did not change for them from the first day to the sixth day.

• On the seventh day, tomato seeds began to grow in the basin that was watered with fresh water, this is illustrated in Figure (2). As for the basin that was watered with salt water, the tomato seeds did not grow, and the salt water concentration in the soil was changed and the tomato seeds did not grow.


- On the eighth day, green leaves of tomato seeds appeared in the basin that was watered with fresh water, this is illustrated in Figure (3). As for the basin that was watered with saltwater, the leaves of tomato seeds did not appear, and the salt water concentration in the soil was changed and note that no seed leaves appeared tomatoes.

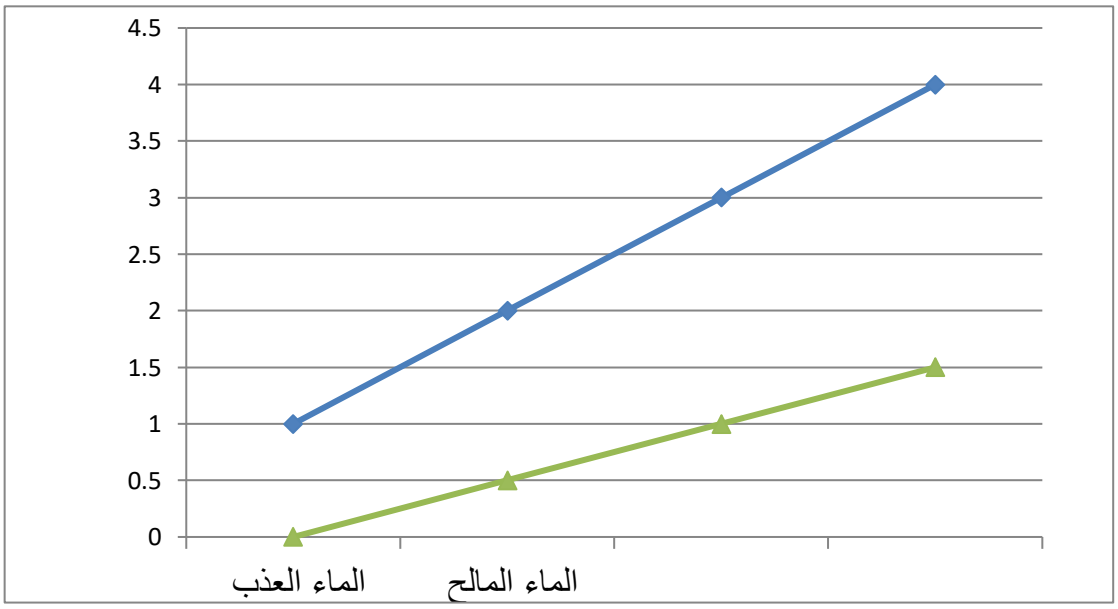
• On the ninth day, the green leaves of tomato seeds were observed to grow more than the previous day in the basin that was watered with fresh water, this is shown in Figure (4). As for the basin that was watered with saltwater, the leaves of green tomato seeds did not appear, and the saltwater concentration was changed in soil and note the absence of tomato seed leaves.

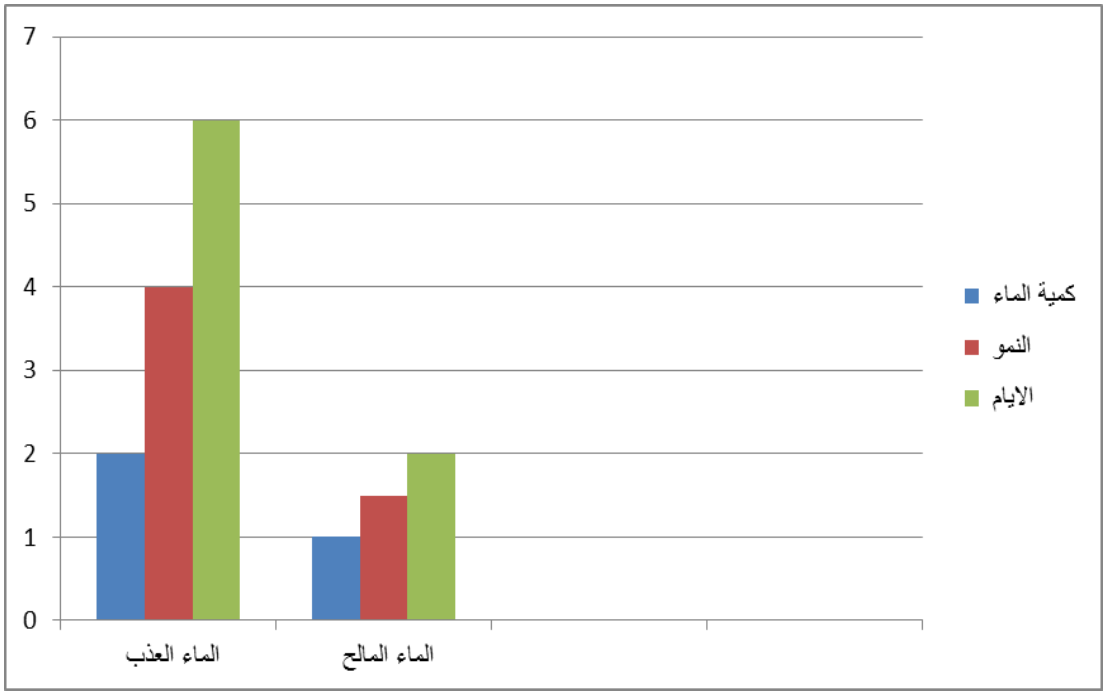
Results:

•Tomato seeds grow using fresh water more and better than salt water in different concentrations. see graph (1).

•The use of fresh water contributes to the growth of tomato seeds, and consequently all agricultural crops, and graph (2) shows a higher growth rate of tomato seeds in fresh water than in salt water.

•Salt water does not help the growth of tomato seeds even if we change the salt concentration in it, and Figure 5 shows the salinity measuring device that was used. Table (1) shows the tolerance of plants to the salinity of irrigation water. We find that the tomato has a salinity of soil of 1600ppm




7
6
5
4
3
2
1
0
الماء العذب
الماء المالح
كمية الماء
النمو
الايام


pH
ORP
TCI
TRACER

Table of tolerance for plants for salinity of irrigation water

	The name of the plant	Salinity of irrigation water ppm(EC^w)	Soil salinity ppm(EC_e)
1	Barley	3392	5120
2	cotton	3264	4928
3	Sugar beet	3008	4480
4	wheat	2560	3840
5	rice	1280	1920
6	Maize	704	1088
7	Bean	704	1024
8	bean	448	640
9	Orange and lemon	704	1088
10	apricot	704	1024
11	Grape	640	960
12	pear	576	832
13	Strawberries	448	640
14	Tomatoes	1088	1600
15	Cucumber	1088	1600
16	Cantaloupe	960	1408
17	Potatos	704	1088
18	Clover	640	960

Recommendations:

•The need to pay attention to agriculture and irrigation to reap good outcomes.

•Fresh water is of great importance in the growth of agricultural crops.

Badges

❖ STEM

Sciences: The practical application of experiment tools.

Technology: Microsoft Office, video montage.

Engineering: graphs.

Math's: Measure plant growth, numbers, and tables.

❖ Community consideration: solving the problem of the impact of agricultural crops and the lack of food resulting from soil salinity, as it has a major impact on the community's food consumption process.

❖Collaboration: collaborate jointly with the Globe Student Team on video montage and take daily notes of plant growth.

References

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from "Soil salinity" in WaterWiki, the on-line Knowledge and Collaboration Tool of the Community of Practice (CoP) on Water- and UNDP-related activities in Central and South-Eastern Europe, Caucasus and Central Asia.

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