The Effect of Use System Dual Drip Irrigation and Add Conditioners Soil in Reducing the Impact of Irrigation Water Salinity in Soil Properties and Growth of Corn Plant. (Zea mays L.)

By
Abdulridha Jasim Oleiwi AL-Bazoon

Summary:

A field experiment was conducted at the research station of the Faculty of Agriculture / University of Basrah / Kermat Ali during the autumn season 2016, .on clay soil . The objective of this research is to study the effect of irrigation water treatments using the proposed dual drip irrigation system and soil conditioners in some of their physical properties mid and end of the maize crop growth season (Zea may L.), horizontal and vertical water movement, accumulated infiltration and infiltration rate in soil profile. As well as some of growth parameters and yield and the water use efficiency by the crop. two levels of irrigation water salinity, low saline water($3.00-3.60$ ds m^{-1}) and high saline water ($7-8$ ds m^{-1}) and six irrigation treatment for the proposed irrigation system as follows:

First treatment Drip irrigation system Single field tube using 100% high salinity water Length of season of growth (I_1). Second treatment Drip irrigation system Single field tube using 100% low salinity water Length of growing season (I_2). The third treatment is a double drip irrigation system for two fixed field tubes (50% high saline water + 50% low salinity water, fixed (I_3)). The fourth treatment is a double drip irrigation system for two subfields (50% high saline water + 50% low saline water (I_4)) in this system gets alternated in high and low salinity , fifth treatment is a double drip system for two field tubes (75% high saline water + 25% low saline water (I_5)). in this system gets alternated in high and low salinity , Irrigation (75% low saline water + 25% high saline water (I_6) in this system gets alternated in high and low salinity .With 20% added as washing requirements for all irrigation parameters.

The soil conditioners factor consisted of three levels, improved (0.2% fuel oil + 0.2% lubrication oil) on dry weight after emulsification with irrigation water

and supplementation as a single treatment (S_1) and organic residues at 2% after the modification of C: N (S_2) and the comparator (S_3). The experiment was carried out by Factorial experiment applying (RCBD) Randomized Complete Blocks Design of full random sector design (RCBD). The experimental units were planted on 30/7/2016 in parallel lines and soil samples , were taken in two stages, The first is after one month of application of the treatments and the second at the end of the growth season, to study some physical properties of soil in depth (0-15), (15-30) and 30 -45 cm). The following is a summary of the study results:

1- The results showed increasing moisture content by increasing the use of high salinity water during the middle and end of the growth season. The spatial and temporal alternation method in addition to the irrigation water used in the proposed irrigation system has had a positive effect on the washing of the salts and their removal outside the root area, which was reflected in the moisture content values and reached 20.53, 20.82, 20.96, 21.67% and 21.73% 22.66, 22.87, and 23.44% at the end of the season and for transactions (I_6, I_4, I_3 and I_5) respectively. Compared to the highest values 21.79 and 23.68% mid-season and end of growth respectively, recorded at the treatment (I_1). On the other hand, there was a significant increase in moisture content values when adding the enhancers with an improved superiority S_2 on S_1 and S_3. The depth (15-30 cm) is characterized by the highest moisture content compared to depths (30-45) and (0-15) cm. And the moisture content of the weight decreases by moving horizontally from the dotted for all transactions.

2-The results showed an increase in the values of electrical conductivity of the soil by increasing the use of high salinity water. The highest values were recorded in the first irrigation treatment (I_1), which reached 11.00 and 11.92 ds m^{-1} mid-season and end of growth respectively. To reduce the values of electrical conductivity at 7.08, 7.86, 8.41, 9.01, ds m^{-1}, 7.40, 7.97, 8.74, and

10.03 ds m^{-1}, middle and end of the growth season and for factors I_6, I_4, I_3, and I_5 respectively. Compared to the treatment (I_1). While the use of the improved and studied levels reduced the values of electrical conductivity of the soil and the rate of 7.74 and 8.01 ds m^{-1}, 8.24 and 8.68 ds m^{-1} mid-season growth and end of the improvements (S_2 and S_1), respectively. Compared to the comparison treatment (S_3) which reached 8.60 and 9.41 ds m^{-1} mid-season and end of growth respectively. And the accumulation of salts is increasing away from the emitter horizontally and vertically.

3-The values of the mean weight diameter, total porosity, saturated Hydraulic Conductivity, accumulated infiltration and infiltration rate were increased by increasing the use of low salinity water while the values of the proposed system treatments including rotational rotation in the gauges (I_6, I_4, I_3 and I_5) The use of conditioners increases the values of these properties significantly with the superiority of the (S_2) in the middle and end of the growth season. The C: N ratio had a role to play in this superiority.

4-The results showed a significant decrease in the values of both the bulk density and the soil penetration resistance. The percentage with the use of low saline water and the processes that include alternation in the springs for the proposed irrigation system treatments (I_6, I_4, I_3 and I_5), respectively. The use of alcohols reduced the values of these properties significantly, mid and end of the growth season in the surface depths, and these values increased with depth with the superiority of the (S_2).

5. There is significant increase in the studied growth parameters, including the leaf area, leaf area index, the middle and end of the growth season, the height of the plants, the dry weight of the vegetative part, and the production at the end of the growing season when increasing the use of low salinity water and the proposed irrigation system (I_6, I_4 and I_3) in order compared to the

treatments with high salinity water use (I_1 and I_5). And when conditioners are used with the superiority of organic waste treatment (S_2) on other treatments.

6-The results showed an increase in both accumulated infiltration and infiltration rate by increasing the use of low salinity water and the use of spatial and temporal rotation in irrigation water quality (I_2, I_6 and I_4) and in the use of conditioners with the superiority of the (S2). And the possibility of representing the results of the water infiltration as accumulated infiltration and infiltration rate using Philippe's equation (1957) and a highly significant determination coefficient.

7-The results showed an increase in wetting front movement of horizontal and vertical wetting advance in soil profile when including alternation in the use of water quality, which increased the use of low salinity water, especially I_2, I_6, and I_4. On the conditioners (S_1). With the possibility of representing the results of the wetting front movement of horizontal and vertical wetting advance of the source of the drip according to the equations of Philip, 1955 and Philip, 1957 and the parameters of determination of high morale and calculate the values of the constants of these equations.

8. The use of proposed irrigation system leads to reduce the use of low salinity water by 25-50-75% and their utilization ratios in I_6, I_4, I_3, and I_5 respectively.

9-The results showed an increase in the water use efficiency by increasing the use of low salinity water and the highest value of 0.847 kg ha^{-1} m^{-3}. The spatial and temporal alternation of water quality in the proposed irrigation system (I_6, I_4, I_3 and I_5) Water efficiency values compared to irrigation treatment 100% high-salinity water (I_1) free of alternation method, which recorded the lowest values and reached 0.496 kg ha^{-1} m^{-3}.