Use of humic acid in the treatment of salt solutions using the germination percentage as a guide to treatment laboratory

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Abstract:

Experiment was conducted, to study the effect of addimg different volume of humic to different concentrations of sodium chloride(NaCl) on plant seed germination. cucumber seeds (high sensitivity to salinity) were selected as an index for percentage of germination which was calculated after a week of nursing

Results indicated that Lack of seed germination of cucumber plant in salt solutions with concentrations of the following ((5000,7000,10000,14000 ppm, but the Irrigation with salt solutions (mentioned above)+ humic acid up to 3400 micro gram) led to significant increase in germination percentage in all salt concentrations so it do well for control salinity effect.

Introduction

Salinity the most important problem enfaced agriculture expanding in whole of the world esp. arid and semi arid zones(1),where rainfall can't be sufficient to leach salts from root zone in addition to high evaporation .
Salinity caused by accumulation of Mg salts , Na salts (esp NaCl , Na_2CO_3 and Na_2SO_4) ,even (4) find that soils may call saline soil if salt conc, more than1.0% or ECe more than 4 mds/cm which is equal to 22%NaCl in other hand plants had different grade of tolerance to salt stress.

Irrigation water contain salts induced by water source and may reach 1000g/m^3. So evaporation and bad drainage with less water to wash salts cause salt accumulation in root zone(12).

Recently ,in order to overcome these effects ,researchers use plant chemical promoters even in soaking seeds in or as foliar application .Humic acid one of the important plant promoters and essential for plant growth ,used to

overcome salt activity on plant germination and growth which cause to increase in plant vitality under salt stress(2)

Soil salinity affect all plant germination(15) found that seed germination of nutalliana plant delayed for one day in NaCl solution of 0.5% and for 8 day 2% NaCl solution. and (14) study the effect of (6 levels) of water salinity (0,4,8,12,16,20 ds/cm)on squash seed and found that increasing of salinity cause decreasing in seed germination and (11) shown that even the germination percentage of cucumber and tomato seeds reduced with using of sea water up to 200,4000g/l for cucumber and up to 4000,8000g/l for tomato plants . whereas(12)indicated that salinity stress cause to less germination and elongation in rootlet in two whweat cultivar(sensitive and tolerant).even adding if NaCl salt cause clear decrease in germination percentage of *zea mayz*. Even (4, 7,8,9,10,14,16)assist on salinity effect on growth ,root length, carbohydrate assimilation, protein content, and many other growth factors.

Methods and Materials

This experiment was conducted at the University of Technology in the laboratories of Applied Science Laboratories Applied Chemistry Branch took the seed of the plant as an option to study this experience.

the chemicals Materials used

Humic acid (salinity regulator)

Sodium chloride salt NaCl for seed germination in salt solutions

Distilled water to dissolve salt

Instruments and requirements used

solutions of sodium chloride Was prepared from dissolving 1,3,5,7,10,14 gm) of salt sodium chloride NaCl in 1000 ml of distilled water

Humic acid solution for irrigation of soaked seeds in salt solution prepared by dissolving 10 gm of granule humic acid (0.85ppm conc,) in 1000ml distilled water (= 850ppm conc.)

Cucumber Seed was germinated in seven X 3 plastic petri dishes (20seeds /dish).

part I

the seeds were watered in the first 3 dishes with (10ml) distilled water and the other was watered with the (six different concentrations prepared respectively (1000,3000,5000,7000,10000,14000 ppm) and the size of 10ml)) for each dish in 3 replicates.

Part II

Cucumber seeds were germinated in another 24 Petri dishes (20 seeds/dish)and irrigated with combination of humic acid conc.XNaCl conc)3replicates each treatment as shown below:

GroupA

10ml of each (1000,3000.5000,7000,10000,14000 ppm) NaCl concentration + 1ml of 850 ppm the humic solution .

GroupB

10 ml of each (1000,3000.5000,7000,10000,14000 ppm) NaCl concentration + 2ml of 850 ppm the humic solution

'Group C

10 ml of each (1000,3000.5000,7000,10000,14000 ppm) NaCl concentrationn + 3ml of 850 ppm the humic solution n

Group D

10 ml of each (1000,3000.5000,7000,10000,14000 ppm) NaCl concentration + 4ml of 850 ppm the humic solution

Results and Discussion

Results indicted that :

1- humic acid caused a decrease in electrical conductivity of solutions but it reach 19.8 ds/cm,with the highest level of NaCl conc. the results shown in fig 1 indicated that humic may correct and reduce the EC within the same NaCl conc.as if there was increasing in added humic acid

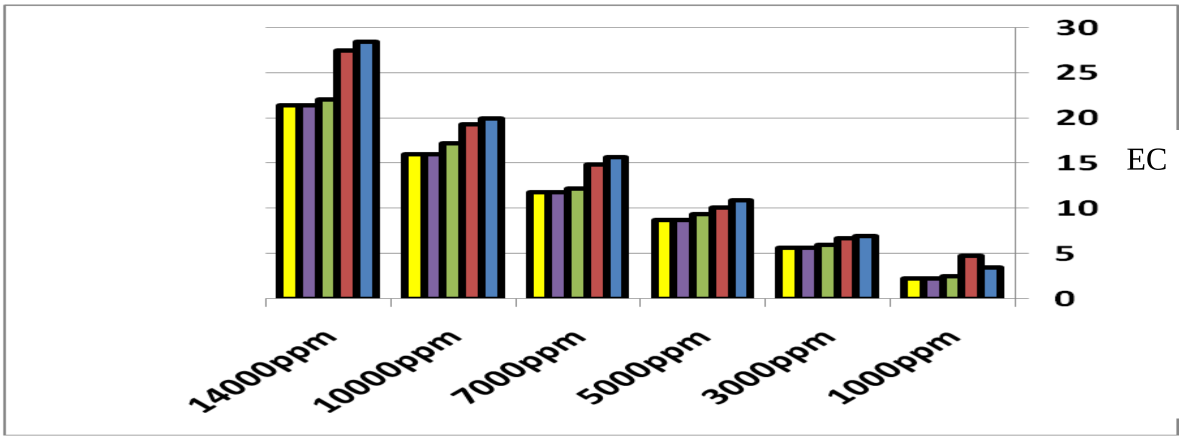

Fig 1: effect of humic acid addition on electrical conductivity of solutions.

2- In this experiment we found that watering with saline water only (table1), significant lack of germination of seeds which may related to the activity of ions causing the salinity of Na, Cl concentrations , but watering seeds with prepared solutions in the above shown concentrations with the addition of volumes of 1ml(=85ppm), 2ml(=170ppm) of the humic acid (table 2&3)change the germination percentage of seeds in solutions The seed geminated all dishes of treatments (1000,3000,5000 &7000 ppm concentrations, and through the linked sodium helps plants to with stand high concentrations of it and protection from toxic and the problems of osmosis associated with these concentrations

Salt concentrations	Electrical Conductivity EC Ds/cm	Germination Percentage (%)
1000ppm	3.45	100
3000ppm	6.97	100
5000ppm	10.9	0
7000ppm	15.7	0
10000ppm	20.0	0
14000ppm	28.5	0

Table (1) shows the percentage of germination in salt solutions with different concentration

Salt concentration +1ml of humic acid	Electrical Conductivity EC Ds/cm	% Germination	Notes
1000ppm	2.8	100	Good seed germination and long radicle root
3000ppm	6.7	100	Good seed germination and variable length of radicle root
5000ppm	10.1	80	Moderate seed germination and medium length of radicle root
7000ppm	14.9	25	Weak seed germination and medium length of radicle root
10000ppm	19.3	0	
14000ppm	27.5	0	

Table (2) shows the germination of seeds in a solution prepared from 10ml of brine with the saline solution with 1ml of humic

Salt concentration +2ml of humic acid	Electrical Conductivity EC Ds/cm	Germination percentage (%)	Notes
1000ppm	2.5	100	Good seed germination and medium radicle root
3000ppm	6.0	100	Good seed germination and with shor radicle root
5000ppm	9.4	95	good seed germination and with short radicle root
7000ppm	12.2	55	Medium seed germination and short radicle root
10000ppm	17.2	25	weak seed germination and with short radicle root
14000ppm	22.1	0	

Table (3) shows the germination of seeds in a solution prepared from 10ml of saline solution with 2ml of humic

3- in the case in our experiment the acid humic adhered with Na^+ and CL^- Move their effect from seeds moreover increase of humic acid quantity even to 3ml/dish(= 255ppm) (table4) we notice that the germination of seeds are good whereas the percentage of seed germination was low in the 10000ppm solution

Salt concentration +3ml of humic acid	Electrical Conductivity EC Ds/cm	Germination percentage (%)	Notes
1000ppm	2.3	100	Good seed germination and with long radicle root
3000ppm	5.7	100	Good seed germination and with long radical root
5000ppm	8.7	90	good seed germination and with medium radical root
7000ppm	11.8	35	weak seed germination and with medium radicle root
10000ppm	16.0	15	weak seed germination and with short radical root
14000ppm	21.4	0	

Table (4) shows the germination of seeds in a solution prepared from 10ml of saline solution with 3ml of humic acid.

4- Extreme increasing in seed germination in saline solution with a concentration 14000ppm was gained with the addition of 4ml humic acid(=350ppm)(table5) and gives good germination percentage with slightly good root growth.

Salt concentration +4ml of humic acid	Electrical Conductivity EC Ds/cm	Germination percentage (%)	Notes
1000ppm	2.3	100	Good seed germination and with long radicle root
3000ppm	5.4	100	Good seed germination and with long radicle root
5000ppm	8.2	90	good seed germination and with medium radicle root
7000ppm	11.5	75	good seed germination and with medium radicle root
10000ppm	15.2	60	Good seed germination and with medium radical root
14000ppm	19.8	55	Slightly good seed germ- ination and slightly medium radical root

Table (5) shows the germination of seeds in a solution prepared from 10ml of saline solution with 4ml of humic

this indicates that the high-salinity solutions need more level of humic acid to restrict ions can cause salinity,as high content of humic acids respond differently to water stress by improving the root system and increase the retention of soil water

From all these above results we can recommend:

1- Ability of using humic acid to over come salinity.
2- We must know kinds of salts and water resources to calculate the ratio of humic use in order to reduce the quantities used of fresh water in irrigation in the future.
3- Continuing research in the future to find the most suitable concentrations and volumes used in the treatment of salinity with humic acid which abound in our country..
4- take advantage of this applied research toward specialized research to address the industrial water-rich heavy elements before it is put into the water rivers

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استخدام حامض الهيوميك في معالجة ملوحة المحاليل باعتماد نسبة الانبات كدليل للمعالجة المختبرية

الخلاصة

اجريت تجربة في مختبرات فرع الكيمياء التطبيقية /قسم العلوم التطبيقية /الجامعة التكنولوجية لدراسة تاثير اضافة احجام مختلفة من حامض الهيوميك الى تراكيز مختلفة من محاليل كلوريد الصوديوم (1000 ، 3000 ، 5000 ،7000 ، 10000 ، 14000 جزء بالمليون) على انبات البذور .استخدمت بذور الخيار (نبات حساس للملوحة) كدليل لحساب نسب الإنبات بعد إسبوع من الحضن

اظهرت النتائج انخفاض في نسبة انبات البذور المروية بمحاليل ملحية اكثر من 5000 جزء بالمليون الا ان اضافة 3400 مايكروغرام من حامض الهيوميك الى مياه الري الملحية ادت الى زيادة معنوية في نسب الانبات وفي جميع المحاليل الملحية مما يشير الى انه ذات تاثير ايجابي في معالجة الملوحة.