

**The effect of sulfuric acid in reducing sodium hazard on
(*Triticum aestivum* L) in salt affected soil
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ABSTRACT

This study was conducted in 10 dsm⁻¹ salt effected soil in Kharif 2004. The treatments tested were T₁, T₂, T₃, T₄ and T₅ equivalent to 0.0, 0.25, 0.5, 0.75, and 1 ml of H₂SO₄ / Kg of soil respectively. Two varieties of wheat were grows Abu-Graib and Ibaa -99. Morphological and physiological parameters (plant height, leaf area, Straw and seed weight) were studied. In Abu-Graib variety the result shows significant increase in all parameters in T₃, T₄, and T₅ is compared with control and high increased obtained in T₅. While in Ibaa variety significant increase obtained in T₄ and T₅ only and high increased obtained in T₄ comparative with control.

Introduction

Iraq has one of the highest ratios salt affected soils compared to total soil cover. More than half of the total territory of this country is seriously affected by salt (Szaboles, 1989). Adverse factors affecting plant growth on solonchale soil are mainly attributed to physical, impediments within the profile which restrict root growth, disrupt the movement of water and cause poor aeration (Cater and Webster, 1979).The adverse effecting plant growth on solonchale soils are mainly attributed to the reduction in percentage and rapid of germination, shoot and root length .Fresh and dry weight and leaf area as well as the effecting of different physiological properties.

Such as protein synthesis, Respiration, photosynthesis ions & molecules transport through the membrane which result as a result in low fertility and limited

agricultural value on land affected by salinity (Al-Hadithi *et al* 1992; Al-Rhamani *et al* 1997; Al- Juboory, 1998).

The Iraqi soil contains about more than 20 % of CaCO_3 (Buringh, 1960; Al-Taie, 1970) this amount of lime determine the a viability of soil nutrition (macro and micro nutrition) so that cause adverse effects on plants growth for this reasons the sulfuric acid applied on sodium affected soil dissolves CaCO_3 to produce a soluble source of calcium and CaSO_4 as well as enhances water penetration (Miyamo *et al* ,1975).

The increase in soluble salt caused by acid application should also contribute to increasing water penetration through the profile to carry.

Added divalent ions (usually Ca^{++}) into and exchanged Na^+ lows out of the root zone (Prather et al, 1978).the high pH caused H_2SO_4 brings about many nutrients such as phosphate, Iron, Zinc and Manganese causing increase in plant growth (Mathers, 1970; Chand et al, 1977; Carter *et al* 1979).Sulfuric acid increase of weather holding capacity of soil as well as water conductivity (Yahia *et al*, 1975; Parther *et al* 1978).

(Mathers , 1970) found increase in yield of hybrid grain sorghum due to more availability of micronutrients by acidification with sulfuric acid (Hussain and Hamid, 1980)reported that sulfuric acid application gave the highest average yield of killer grass (*Leptochloa fusca* L.)and did lower the pH and ESP of the soil after cropping (Al-Juboory, 1998)reported that sulfuric acid application gave the high rate of length ,dry weight, leaf area , of shoot and chlorophyll, protein ,Ca ,K concentration in corn(*zea mays* L.).

This study was undertaken for reclamation of moderately salt affected soil with sulfuric acid to decrease of sodium hazard on growth of wheat.

Materials and Methods

The study was carried out on a pots contain 2kg of salt effected soil (Ec 10 des⁻¹).Soil samples were collected from 0-30 cm in soil depth before initiation of the experiment. (Two local variety of wheat were growth Abu Graib and Ibaa-99) 10 seed were growing in each pot and dilution after one week to 5 seedlings. The required quantity of commercial H₂SO₄ was also applied at the start of experiment with irrigation water after 14 days from grows as 0.0 ,0.25, 0.5, 0.75 and 1 ml / kg of soil (T₁,T₂,T₃,T₄, and T₅)respectively. The treatments were allocated randomly in arandomoized complete block design with three replicates for each treatment. Morphological and physiological parameters (average length of shoot, leaf area, straw and seed weight) were studied.

Results and Discussion

In Abu- Graib variety the parameter (plant height , leaf area , straw and seed weight) shows significant affected by different treatments, but different between T₁ and T₂ were not significant(table 1).Higher increased in all parameters were obtained when H₂SO₄ was applied equivalent to 1 ml /Kg of soil T₅ followed by T₄ ,T₃, T₂ and control respectively .There were on an average , 22.7, 52.1, 60.8 and 80.7 % increase in T₂, T₃ ,T₄ and T₅ respectively,where compared with control (table 3) .While in Ibaa variety the parameters shows significantly affected by different treatments but different between T₁, T₂ and T₃ were not significant (table 2) .The highest increase was also obtained when H₂SO₄ was applied equivalent to 0.75 ml / kg of soil T₄, followed by T₅, T₃ ,T₂ and control respectively on an average there was 21.4 , 59.4, 44.0 and 66.6% increase over control in T₂, T₃, T₄ and T₅ respectively(table 4).

More increased obtained in the H₂SO₄ treatments over were possibly due to improvements in the physiological properties, consequently availability of more plant nutrients to the crops.

(Hussain and Hamid 1980; Chaudhry *et al* 1989 and Al- Juboory, 1998) reported increase.In plant growth with the application of the amendment H₂SO₄ as composed with control.

(Table 1) The effected of H₂SO₄ applied in decrease of sodium hazared on growth of Wheat (Abu Graib variety)

Treatments	Plant height cm	Leaf area cm ²	Straw weight gm / plant	Grain yield gm / plant
T1	45.2	2.3	2.3	1.4
T2	47.4	2.4	2.8	1.6
T3	50.5	3.1	3.1	2.0
T4	54.0	3.4	2.3	2.1
T5	55.5	3.5	3.7	2.6
L.S.D 5%	5.2	0.23	0.78	0.58

(Table 2) The effected of H₂SO₄ applied in decrease of sodium hazared on growth of Wheat (Ibaa-99 variety)

Treatments	Plant height cm	Leaf area cm ²	Straw weight gm / plant	Grain yield gm / plant
T1	38.7	2.2	2.5	0.9
T2	40.4	2.5	3.0	1.1
T3	41.1	2.7	3.1	1.2
T4	47.0	3.5	3.6	1.5
T5	44.4	3.4	3.1	1.2
L.S.D 5%	5.8	0.51	0.62	0.45

Note L.S.D.: The numbers in the table represent the rate of 5 plants / pots.

(Table 3). The percentage of increase in parameters over control in Abu-Graib variety of Wheat

Treatments	Plant height cm	Leaf area cm ²	Straw weight gm / plant	Grain yield gm / plant
T1	100	100	100	100
T2	104.8	104.3	121.7	114.2
T3	111.7	134.8	134.7	142.9
T4	119.4	147.8	139.1	150.0
T5	122.7	152.1	160.8	185.7

(Table 4). The percentage of increase in parameters over control in Ibaa-99 variety of Wheat

Treatments	Plant height cm	Leaf area cm ²	Straw weight gm / plant	Grain yield gm / plant
T1	100.0	100.0	100	100
T2	104.3	113.6	120.0	122.2
T3	106.2	122.7	124.0	133.3
T4	121.4	159.0	144.0	166.6
T5	115.2	154.5	124.0	133.5

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اثر حامض الكبريتيك في تقليل الاثر الضار للصوديوم في نباتات الحنطة (*Triticum aestivum* L.) في التربة المتأثرة بالاملاح

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الخلاصة

أحرقت هذه الدراسة في خريف (2004) باستعمال تربه متأثره بالاملاح 10ديسيمنز /م حيث اسعمل فيها خمسة معاملات من حامض الكبريتيك(T5,T4,T3,T2,T1) وبتراكيز (0, 0.25, 0.5, 0.75, 1.0 مل/كغم تربه) على التوالي. كما استعمل في هذه الدراسة صنفين محليين من الحنطة هما ابو غريب وابعاء-99. درست بعض المعالم المظهرية والفسلجية (ارتفاع النبات، المساحة الورقية، وزن القش ووزن البذور)فقد اظهر الصنف ابو غريب زيادة معنوية للصفات المدروسة في المعاملات T5,T4,T3 مقارنة بمعاملة السيطرة وان اعلى زيادة كانت في المعاملة T5.بينما اظهر الصنف اابعاء-99 زيادة معنوية للصفات المدروسة وللمعاملتين T5,T4 فقط وان اعلى زيادة كانت في المعاملة T4 مقارنة بمعاملة السيطرة .