ORGANIC MANURING TO ALLEVIATE SALINITY HAZARDS OF DRIP IRRIGATION WATER FOR BARLEY ON A SANDY SOIL IN NORTH SINAI

BY

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A THESIS

Submitted in Partial Fulfillment of the

Requirements for the Degree of

DOCTOR OF PHILOSOPHY

in

Soil Science

Soil and Water Science Department
Faculty of Agriculture, Moshtohor
Benha University

2019

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5. SUMMARY AND CONCLUSION

A field experiment was conducted in Wadi El-Arish, North Sinai, Egypt to study the assess a methodology to alleviate the retarding effect of saline irrigation water on growth and production of barley (*Hordeum vulgare*, L. "Var., Giza 123") in a sandy soil during the winter season of 2015/2016. The experiment involved three factors and was excited in a randomized complete block ,factorial in 3 replicates The factors were : **Factor 1:** Organic acids through water; i.e. none(D_0), humic acid (D_1) and fulvic acid (D_2);at 50 L ha^{-1} starting 15 days after seeding **Factor 2:** Organic manuring i.e. none (M_0), farmyard manure (M_1) and compost (M_2);at 50 Mg ha^{-1} applied during soil preparation **Factor 3:** Proline spray; none (P_0) and spray (P_1),2mg proline L^{-1}, 6 sprays each of 1200 L ha^{-1}. Overall total plots = 54 and the plot area was 10.5 m^2.The experiment was irrigated with underground well water of El-Arish Agriculture Research Station EC=8.38 dSm^{-1}. The experiment field was fertilized withN as ammonium nitrate (330 g N kg^{-1}) at 200 kg N ha^{-1} given in 3 splits: one tenth during soil preparation and the remainders applied in 2 equal splits, one after 30 days of seeding and the other 20 days later. P as ordinary super phosphate (65 g P kg^{-1}) at 30 kg P ha^{-1}applied during soil preparation .K as potassium sulphate (410 g K kg^{-1}) was given at 120 kg K ha^{-1} in 2 equal splits one during soil preparation and the other at tillering. Plant samples were collected at 120 days after harvest. Plant height, weight of 1000-grain, yield productivity. Uptake of N,P,K, Fe, Mn, Zn, Cu were measured. At harvest soil pH, EC, moisture constants, Bulk densisty,

hydraulic conductivity andavailable nutrients were determined. Addition of all amendments singly or in any combination increased plant traits of height, 1000-grain weight and yields

1) Lowest height was 80.53 cm under $D_0M_0P_0$ and highest was 99.20 cm under $D_1M_1P_1$ treatment with a percentage increase up to 23.2%.
2) Lowest 1000-grain yield was 30.33 g by $D_0M_0P_0$ while the highest was 50.07 g by $D_1M_1P_1$ a percentage increase up to 65.1%.

Straw yield: Lowest was 7.87 Mg $ha^{-1}$by $D_0M_0P_0$ and heighst 13.3 Mg ha^{-1}byr $D_1M_1P_1$ a percentage increase of 69%.

Grain yield: Lowest 2.97 Mg $ha^{-1}$by $D_0M_0P_0$, highest 6.17 Mg ha^{-1} by $D_1M_1P_1$ treatment with a percentage increase up to 107.7%.

Nitrogen Uptake:

1) Lowest in straw was 27.7 kg ha^{-1} by $D_0M_0P_0$ highest was 163.6 kg ha^{-1} by $D_1M_1P_1$ a percentage increase 490.6 %.
2) Lowest in grains 44.6 kg ha^{-1} by $D_0M_0P_0$ and highest213.6 kg ha^{-1} by $D_1M_1P_1$ a percentage increase 379.0%.

Phosphorus Uptake:

1) Lowest in straw 9.3 kg ha^{-1} by $D_0M_0P_0$ and highest 48.3 kg $ha^{-1}$by $D_1M_1P_1$ a percentage increase 419.4%.
2) Lowest P-uptake in grains 20.4 kg $ha^{-1}$by $D_0M_0P_0$and highest 83.3 kg $ha^{-1}$by $D_1M_1P_1$ 308.0% increase.

Potassium Uptake:

1) Lowest in straw 15.7 kg ha^{-1} by $D_0M_0P_0$ highest 69.1 kg ha^{-1} by $D_1M_2P_1$ an increase 340.1%.

2) Lowest in grains 32.0 kg ha^{-1} by $D_0M_0P_0$ and highest 122.3 kg $ha^{-1}$by$D_1M_2P_1$; 282.2% increase.

Micronutrient uptake (in g ha^{-1})

Iron uptake

Lowest in straw 327; highest 1007 by $D_1M_2P_1$,121.0% increase

Lowest in grains 230; highest 933 by $D_1M_2P_1$ 305.5% increase.

Manganese uptake

Lowest in straw 177, highest 437 by $D_1M_2P_1$ 121.0% increase

Lowest in grains 93, highest 270 by $D_1M_2P_1$ 190.3% increase

Zinc uptake

Lowest in straw 520, highest 1570 by $D_1M_1P_1$ 219.2% increase.

Lowest in grains 403, highest 1420 by $D_1M_1P_1$ 252.4% increase

Copper uptake

Lowest in straw 13, highest 167by $D_1M_1P_1$ 28.5%increase.

Lowest in grains 10, highest 127 by $D_1M_1P_1$ 170.0% increase

Available nutrients in soil at harvest.

All treatments providing materials showed increases in available nutrients in soil after harvest of barley.

Macronutrients "NPK" content of the soil after harvest:

Highest N, P and K were 161, 13.6 and 164.2 mg kg^{-1} soil, respectively by $D_1M_2P_1$, $D_1M_1P_1$ and $D_1M_2P_1$ respectively, while lowest of 50, 13.6 and 84.6 mg kg^{-1} soil, respectively by $D_0M_0P_0$..

Available Micronutrients "Fe, Zn, Mn and Cu"

Highest Fe, Zn, Mn and Cu of 11.88, 2.48, 6.4 and 0.65 mg kg^{-1} soil, respectively were by $D_1M_2P_1$ and lowest of 4.13, 0.86, 4.3 and 0.33 mg kg^{-1} soil, respectively were by $D_0M_0P_0$ treatment.

Soil pH were slightly decreased with the addition of organic amendments

Lowest EC of 2.89 dS m^{-1} and highest was 6.34 dS m^{-1}.

Saturation percentage (SP) and Cation exchange capacity (CEC) of the Soil after Harvest:

Organic amendments singly or in any combination increased SP by ranges of 27% to 32%. Lowest CEC 6.57 $mmol_c$ $kg^{-1}$by $D_0M_0P_0$ and highest 14.28 $mmol_c$ kg^{-1} by $D_1M_1P_0$.

Moisture: Field capacity (FC), wilting point (WP) and available water (AW)

All amendments increased moisture constants Lowest FC was 12% by $D_0M_0P_0$ and the highest of 14.5% was by $D_1M_1P_1$ an increase of 20.8%. Lowest WP was 4.5% under $D_2M_0P_0$ highest was 6.5% under $D_1M_1P_0$. Lowesr AW was 6.0% under $D_0M_0P_1$ and highest was 8.2% under $D_1M_1P_0$

Hydraulic conductivity (K) of the Soil after Harvest:

Compost (M_2) was superior to the FYM (M_1) decreasing K from 1.29 m day^{-1} to 0.85 m day^{-1}

Bulk density (BD) and Total porosity (TP) Harvest:

Since BD and TP are two opposing facets of same property i.e. an increase of is a decrease of the other. Thus presentation of BD will be given. BD of the non treated was 1.76Mg m^{-3} tobecome 1.70 Mg m^{-3}, particularly with treatments given manures.

Organic matter (O.M)

Organic amendments increased soil OM; lowest was 1.00 g kg^{-1} under $D_0M_0P_0$ treatment highest of 3.22 g $kg^{-1}$was under $D_1M_2P_1$.