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Al-Quds University

The Environmental Impact of Using Magnetized Water in irrigation of Herbs Crop in The Lower Jordan Valley/ West Bank-Palestine

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Dedication

This work is dedicated to my beloved family for their support.

A special feeling of gratitude to my loving parents, whose words of encouragement and push for tenacity were as a ring in my ears. My sisters and brothers have never left my side and are very special. I also dedicate this thesis to my best friends who have supported me throughout the process.

This work was done specially to assist my lovely homeland **"Palestine"**...

Declaration

I certify that this thesis submitted for the degree of Master is the result of my own research, except where otherwise acknowledged and that this thesis (or any part of the same) has not been submitted for a higher degree to any other university or institution.

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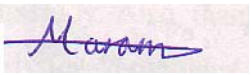
Signed: 

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Abstract

Agriculture is considered to be one of the most important sectors of the national income and food security in Palestine. It's located mainly in Lower Jordan Valley, Tubas, Jenin, Qalqleih, and Tulkarem. There is a serious need to develop this sector by improving the ways of irrigation and the quality of water used. Lower Jordan Valley depends on ground water for irrigation which contains high levels of salts. The increase in water salinity has negative impact on soil structure, decrease permeability and soil aeration, and also reduces crops diversity and crops yield.

This problem was solved by using Magnetic Water Technology. The technology of using magnetized water in the irrigation of different crops is widely used nowadays. This technology has a great impact on decreasing soil salinity, resulting in an increase on water productivity and fresh yield of plants.

In the current pilot project, the work was directed toward using magnetized water in the irrigation of medical herbs (Oregano and Terragon). The global increase on the demand of medical herbs makes the Lower Jordan Valley area an attractive field for growing medical herbs during cold winter months (2012/2013). The studied herbs were planted in greenhouses. For each crop (Oregano and Tarragon) two greenhouses were planted, one was irrigated by magnetized water and the other by controlled water (untreated water). During two months, the height, major and minor branches, crops yield, water productivity and chlorophyll and water contents were measured, in order to be studied. The soil electrical conductivity was measured for both soils (treated and controlled) using EC meter. After recording and analyzing data, it was found that the magnetic treatment of water has a positive effect on increasing the fresh yield, water productivity, water and chlorophyll contents, and fresh root biomass for both Oregano and Tarragon. The influence of magnetized water on Tarragon was less than that on Oregano which indicate that Tarragon is more resistant to salinity than Oregano.

There was a decrease in the number of blocked drippers for treated water compared to controlled water for both medical herbs. Based on these results, the number of damaged seedlings was higher in the greenhouse irrigated by controlled water for Oregano

but unlike expected the number of damaged seedlings was lower in the greenhouse irrigated by controlled water for Tarragon. In addition it was found that the salinity of soil was decreased when using magnetized water.

الأثر البيئي لاستعمال المياه المعالجة مغناطيسياً في ريّ محاصيل الأعشاب في منطقة غور الأردن

إعداد: مرام هشام خميس بصيلة.

المشرف: د. عامر مرعي.

الملخص

يعتبر القطاع الزراعي من اهم القطاعات التي تساهم في زيادة الدخل القومي والأمن الغذائي في فلسطين، حيث تتركز في بشكل اساسي في منطقة غور الأردن وطوباس وجنين وقلقيلية وطولكرم، ونظرا لأهمية هذا القطاع هناك حاجة ماسة للعمل على تطوير طرق الري وتحسين نوعية المياه المستخدمه بالري، حيث ان الزراعة في غور الأردن تعتمد بشكل أساسي على الري من المياه الجوفية والتي تعاني من مشكلة الملوحة الزائدة وهذه الملوحة لها أثار سلبية على كل من التربة والمحاصيل فتقلل نفاذية التربة وتهويتها كما تؤدي الى تقليل تنوع النباتات وكمية المحاصل.

ولحل هذه المشكلة تم استخدام تكنولوجيا معالجة المياه مغناطيسيا، والتي انتشرت مؤخرا في عدة بلدان لري انواع مختلفة من المحاصيل، حيث ان لهذه التكنولوجيا اثار ايجابية على ملوحة التربة وزيادة المحاصيل وانتاجية المياه.

لوحظ زيادة الإعتماد العالمي على استخدام الأعشاب الطبية وكانت منطقة الغور منطقة استراتيجية ومناسبة لزراعة هذه الأعشاب، وقد تم في هذا المشروع دراسة تأثير استخدام المياه المعالجة مغناطيسياً على نوعين من الأعشاب الطبية وهم الزعتر والترغون وقد نفذ هذا المشروع في شتاء (٢٠١٢-٢٠١٣). وهذه الدراسة تمت في البيوت البلاستيكية حيث تم زراعة بيتين بالزعتر واخرين بالترغون وري احدى البيتين بالمياه المعالجة والآخر بالمياه العادية(غير معالجة).وخلال فترة الدراسة قمنا بمراقبة نمو النباتات وعدد الفروع للنباتات كما قمنا بعمل فحوصات مخبرية مثل نسبة المياه والكلوروفيل لكلا العشبتين ومقارنة نتائج النباتات المروية بالمياه المعاجة والمياه العادية، كما قمنا بدراسة الانتاجية لكلا المحصولين.

ومن خلال الدراسة لاحظنا زيادة في الانتاج وانتاجية المياه لصالح الاعشاب المروية بالمياه المعالجة، كما سجلنا زياده في نسبة المياه التي تحتويها الاعشاب وكذالك زيادة في كمية الكلوروفيل المنتجة، وكان هناك زيادة في كتلة الجذور لكلا العشبتين.

وكان من الملاحظ ان تاثير المياه المعالجة اكثر وضوحا لعشبة الزعتر منها لعشبة الترغون، مما دفعنا الى الاستنتاج ان عشبة الترجون اكثر مقاومة للملوحة.

وعند دراسة عدد النقاطات المغلقة نتيجة ملوحة المياه وجد ان عددها اقل عند استخدام المياه المعالجة. كما لوحظ ان عدد النبتات المفقودة في البيت المروي بالمياه العادية اكثر من عددها في البيت المروي بالمياه الغير معالجة بالنسبة للزعتر وعلى العكس كانت بالنسبة للترغون.

وكذلك كان للمياه المعالجة تاثيرا ايجابيا على ملوحة التربة، حيث ان ملوحة التربة كانت اقل للتربة المروية باستخدامها.

List of Abbreviation:

Abbreviation	Full Name
kg/ m^3	Kilogram per cubic meter
MCM	Million cubic meter
LJV	Lower Jordan valley
mm/a	Millimeter annually
mS/cm	Milli-siemens per centimeter
MoA	Ministry of Agriculture
RO	Reverse Osmosis
FAO	Food and Agriculture Organization of the United Nations
C	Control
T	Treated
MWT	Magnetic water treatment
TDS	Total Dissolved Solids
EC	Electrical Conductivity
m^3	Cubic meter
m^3/h	Cubic meter per hour
NPK	Nitrogen phosphorus potassium
m^3/dun	Cubic meter per dunum
gm	Gram
ml	Milliliter
AQU	Al-Quds University
mg	Milligram
cm	Centimeter
kg	Kilogram
kg/dun	Kilogram per dunum
Na	Sodium
Mg	Magnesium
Ca	Calcium
Cl	Chloride
m	Meter
m^2	Meter square
km^2	Kilometer square
nm	Nanometer
kw/m^3	Kilowatt per cubic meter
µS/cm	Micro Siemens per centimeter
MW	Magnetized Water

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