



# Effect of Using Magnetized Treated Water in Irrigation of Bell Pepper and Beans in AL-Jeftlik Area / West Bank – Palestine

Dia Radeideh

Dia Karajeh

Nawaf Abu Khalaf

Amer Marei

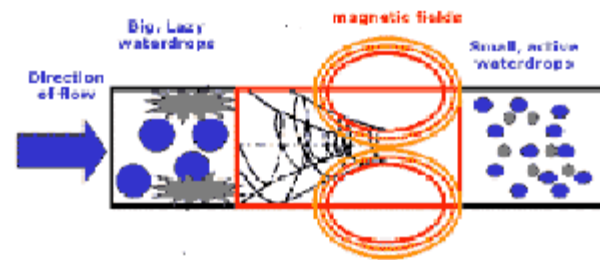
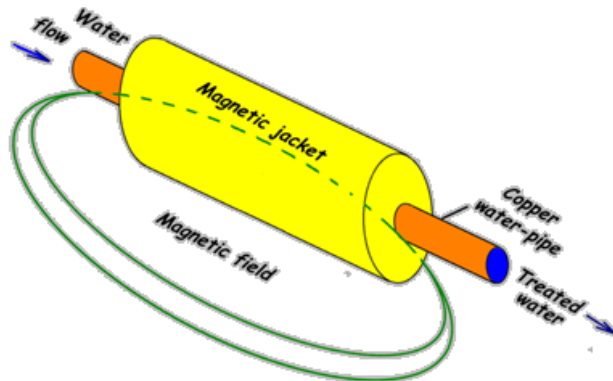
25, Feb, 2015

# HOW TO MANGE WATER SALINITY?

1. To find new water source with good quality (Not available)
2. Desalinisation of available brackish water (High investment and energy consuming)
3. Treatment of water by using magnetic device (Low investment)

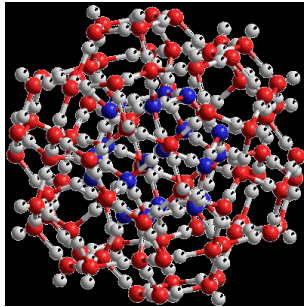
# Magnetic Water Treatment (MWT)

- Discovery in 1803 by natural magnetic rocks.
- Magnetic water : is a water passed through a magnetic field ,lead to change on behavior of water molecules and salts ions ,which leads to change in water physical properties .



# TECHNOLOGY BEHIND THE MAGNETIC TREATMENT :

- Based on the vibration of water molecules that surround the salts ions ,which splits the water molecules cluster. The entrapped salt particles become unbound and have the ability to move outside the water clusters.



- The salt particles form nucleation centers, these centers form platelets that avoid the formation of hard crystal residual.
- This convert the dissolved minerals (salts) under saturated condition into a mixture of micro-crystals, and water become under saturation, and allow water to dissolve additional minerals through its percolation pathway .

# WHAT ARE THE IMPACT OF THIS TECHNOLOGY

1. Limit the negative impact of salinity on crops
2. Opening clogged drippers and for washing salts from the upper soil horizon .
3. Lowering the water surface tension ,which allows water and nutrients to move faster within the upper soil horizon and reach the root zone in a shorter time .
4. Reducing the surface tension will increase water absorption through the root cell wall and thus accelerating the growth rate of plant .

# Problem statement:

Table1 : The Negative Impact of Using Brackish Water in Agriculture

Effect on soil and water	Effect on crop diversity	Effect on socio-economy
<ul style="list-style-type: none"><li><input type="checkbox"/>Changes in soil structure, decreasing permeability and soil aeration.</li><li><input type="checkbox"/>Increase the salinity of ground water by return flow.</li><li><input type="checkbox"/>Increase the consumption of water .</li></ul>	<ul style="list-style-type: none"><li><input type="checkbox"/>Increase plant toxicity .</li><li><input type="checkbox"/>Low crop yield.</li><li><input type="checkbox"/>Low crop quality.</li><li><input type="checkbox"/>Less crop diversity .</li><li><input type="checkbox"/>Mono crop culture.</li><li><input type="checkbox"/>Increase pest risk.</li></ul>	<ul style="list-style-type: none"><li><input type="checkbox"/>Low value of land price.</li><li><input type="checkbox"/>Low agriculture income.</li><li><input type="checkbox"/>Less man power.</li><li><input type="checkbox"/>High investment on new crops.</li><li><input type="checkbox"/>High risk of mono agriculture culture..</li><li><input type="checkbox"/>Price degradation.</li></ul>

# Objectives :

## ➤ Major Objective:

To study the impact of using MWT in irrigation of Bell Pepper and Beans .

## ➤ Minor Objective:


- 1- To monitor the impact on soil salinity.
- 2- To monitor the impact on nematodes.







Table 2: Parameters and Names of Measurement Methods

Parameter	Measurements method
Plant height. no. of branches. distance between nodes. flowers No. leaves No. No. of Fruits/plant	All these parameters were monitored in the field
Total Chlorophyll	UV Spectrophotometer at 645 and 663 nm
Sugar content	Brix Portable Refract meter Device 
Height and thickness of the wall	Vernier instrument
Elemental composition of fruits	ICP-MS (Inductivity Coupled Plasma-Mass Spectrometer)
Soil water extraction	EC Meter , EC electrode
Roots weight	Electronic Balance

# Result

## Soil salinity

The effect of MW on soil salinity for two crops had slightly significant decreased :

- **Bell Pepper crop :**

- At a depth of 10 cm**

- Average soil salinity under treated condition(  $E_c = 0.26 \text{ mS/cm}$ )

- Average soil salinity under controlled conditions (  $E_c = 0.38\text{mS/cm}$ )

- At a different depths of ( <5 , 10 ,20,30 ,40.50,60,70 cm )**

- Soil salinity at the upper 20 cm under treated conditions ( $E_c$  between 0.31 -0.97  $\text{mS/cm}$  ) lower than controlled conditions ( $E_c$  between 0.34 -2.88  $\text{mS/cm}$  )

- **Beans crop :**

- Treated = 0.69  $\text{mS/cm}$

- Control = 0.74 $\text{mS/cm}$

# Yield

Clear positive effect of MTW on yield of bell pepper and beans crops .

## Bell pepper:

Treated yield of one dunum increased about (1061.25 , 1052.4) 18 ,20 % for yellow and red bell pepper respectively .

The financial returns to cultivate 30 dunums where the average price for kilo is 5 NIS = 159,150 – 157,800 NIS

## Beans :

Treated yield of one dunum increased about ( 27.3) 9% .

The financial returns ( Price / kilo is 8 NIS ) = 6528 NIS

# Crop Quality of Bell Pepper

- Influence of Magnetic Water Treatment on Chlorophyll Content:  
Treated Bell Pepper leaves - 10mg/g  
Non treated Bell Pepper - 7.5 mg/g
- Influence of Magnetic Water Treatment on *Number of Rooms (units)*:  
Treated bell pepper produces 37% four rooms more than the non- treated bell pepper .
- Influence of Magnetic Water Treatment on Shelf Time:  
Shelf time for treated sample was one week longer than that of controlled samples .

- Influence of Magnetic Water Treatment on *Weight of Individual Bell Pepper Fruit*:

Average Weight of treated fruit = 233g

Average Weight of non-treated fruit = 211g

- Influence of Magnetic Water Treatment on Dry Weight of Roots:

Average weight of treated plant = 94g

Average weight of non-treated = 73g



# Elemental Composition of Fruits:

Element	Treated	Control
Li	71	12
B	25	10
Na	25	21
Mg	1274	676
Al	21	6
K	74704	38930
Ca	19	15
Mn	61	34
Fe	4	2
Co	6	6
Ni	7	3
Cu	17	10
Zn	8	6
Sr	10	6
Mo	0	0
Ag	1	3
Cd	5	1
Ba	0.5	0

Table 10: Concentration of Element for Treated and control Bell Pepper Fruits (ppb)

# Root Knot Nematodes (*Meloidogynespp.*) activity

Figure 2 :Dead Nematodes under Treated Condition (Magnetic Water)

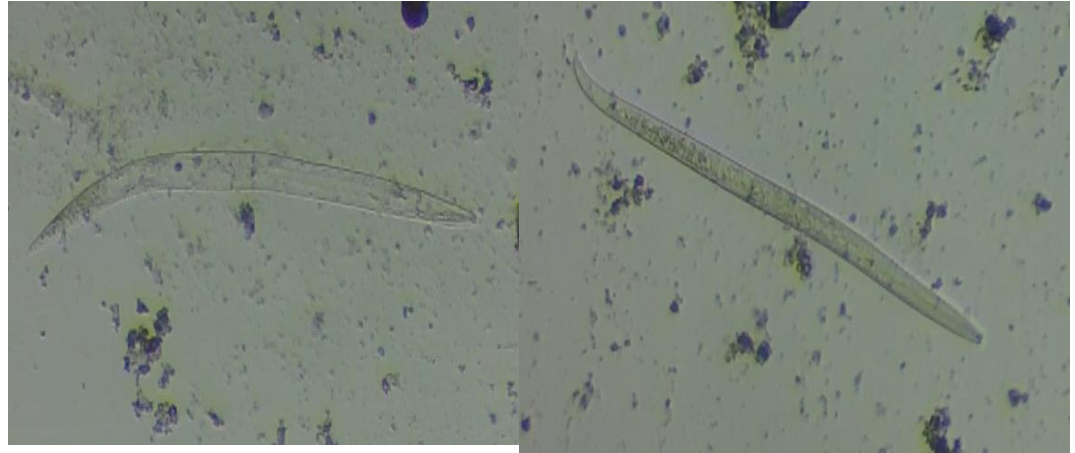


Figure 3 : Active Nematodes under Controlled Condition







Figure 4 : Beans Root from Left Side, Roots with Nodules; and Treated Roots without Nodules at the Right Side

# Conclusion and Recommendation

## Conclusion:

- Soil salinity decreased by using Magnetic Water Treatment (MWT).
- There was a clear positive effect of magnetic treated water on the yield (quantity and quality).
- Magnetic water effect on soil pest especially root knot nematode where the activity of soil nematodes under treated condition was weaker than those under control condition was strong.

## **Recommendation**

Promising techniques like the magnetic water treatment that are used for agriculture improvements, needs more extensive research on different crops.

*Thank you for your attendance*