J.Soil Sci. and Agric. Eng., Mansoura Univ., Vol. 6 (5): 687 - 703, 2015

SALT STRESS MITIGATION BY SEED SOAKING AND MAGNETICALLY WATER TREATMENT TECHNOLOGY

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ABSTRACT

In an endeavor to alleviate the inherent problems an agricultural production such as water shortages, desertification and salinity……. some possible manipulation on soil and seeds were evaluated . Field experiment was carried out to achieve the main objective of this research, at El-Ismailia Research Station, El-Ismailia Governorate, for two successive winter seasons (2012\2013 and 2013\2014), to determine the best treatment possible on amelioration of sandy loam soil properties and its productivity, of Faba bean crop Giza 717 under drip irrigation system, and irrigated well water salinity. Seed soaking in some solutions' of different components for 2 hours before cultivation, as well as the different addition of magnetic iron ore (magnetite) at a rate of 150 kg fed^{-1}. one of the treatment for magnetically water, and a mixture ores(control) at a rate of 200 kg fed^{-1}. in both the soil alone.

The obtained data showed that addition any of the previous treatments led to an improvement in some of the physical and chemical properties, due to increasing the moisture content of the soil; available water; hydraulic conductivity values. While, bulk density, total calcium carbonate ,soil penetration, EC_e and pH were decreased by using soil treatment with magnetic iron ore (magnetite) comparing using the mixture ores (control). Furthermore, Biotwol spray with the treatment of magnetic iron ore gave highest values of the yield (1470 kg fed^{-1}.) compared with spraying yeast with either magnetic iron ore or a mixture of ores (control).

Keywords: seed soaking, magnetic iron ore, irrigation water salinity, treatment magnetic water.

INTRODUCTION

Nowadays, iron oxide plays a crucial role in various applications and is intensively investigated, especially for its application in magnetic materials, such as effect of magnetic iron ore on the physical and chemical properties of soil by magnetic field 4000 gauss/oersted (Adi Rahwanto et al. 2013) Magnetite nanoparticles (2–14 nm) remain in a particular position of magnetic materials due to their unique physico-chemical properties. (Berqu´o *et al.*2007). Agricultural crops face different types of biotic and a biotic stresses. Among a biotic stresses, salinity is very harmful and adversely affects the agricultural production However productivity and internal drainage of saline soils can be restored to some extent by better management practices like combination of physical and chemical treatments (Zia *et al.,* 2006). Salinity is one of the most severe environmental factors limiting the productivity of agricultural crops. Salinity can negatively affect plants through three limited components: osmotic, nutrition's and toxic stresses (Lauchli and Epstein 1990 and Munns 1993).

Seed priming or osmo conditioning is a pre-sowing, controlled hydration treatment in which seeds are exposed to a water potential sufficiently low to permit pre-terminative metabolic activity without protrusion of the radical through the seed coat (Heydecker and Gibbins, 1978), whilst seed hardening involves water-soaking and drying back of seeds (Austin et al., 1969). Although primed batches of seed generally germinate more rapidly and uniformly than untreated ones, a major constraint of the technique's application is occasional germination of seeds during the prolonged treatment period (hereafter termed premature germination). Jett et al. (1996) established that the optimum enhancement of primed seeds would occur just below the osmotic potential threshold for their germination or else premature radical protrusion occurs, while Mauromicale and Cavallaro (1995) suggested a cultivar-dependent response. The osmotic potential of the priming solution influences premature germination through its effect on water uptake by the seed (Prakash and Prathapasenan, 1988) as does the priming temperature (Chung Seong et aL, 1986).

Many researchers have taken this as evidence that the germination of seed during priming depends not only on imbibitions rate (Bewley and Black, 1978; Sebanek, 1992).

Osmotic stress induced by soil salinity affects plant growth and development (Sairam & Tyagi, 2004). Salinity alters general metabolic processes and enzymatic activities, causing increased production of reactive oxygen species (Menezes- Benavente et al., 2004). Poor germination and seedling establishment are the results of soil salinity. It is an enormous problem adversely affecting growth and development of crop plants and results into low agricultural production (Maas, 1986.). Nearly 20% of the world's cultivated area and nearly half of the world's irrigated lands are affected by salinity (Zhu, 2002).).

Presoaking seeds with optimal concentration of phytohormones as produced from yeast and fungi has been shown to be beneficial to growth and yield of some crop species growth under saline conditions by increasing nutrient reserves through increased physiological activities and root proliferation (Singh and Dara, 1971). The response of plants to a salinity stress may vary with the genotypes. Salinity can affect plant physiological processes resulting in reduced growth and yield (Yamaguchi & Blumwald, 2005) Increased tolerance to salinity stress in crop plants is necessary in order to increase productivity with limited water supplies and high salinity. Tolerant genotypes respond to salinity stress with complex changes in their physiological and molecular status (Morsy *et al.*, 2007). During the course of salinity stress, active solute accumulation of osmotic solutes such as soluble carbohydrates, proteins and free amino acids is claimed to be an effective stress tolerance mechanism. The adaptability of plant species to high salt concentrations in soil by lowering tissue osmotic potential was accompanied by accumulation of these osmotic solutes (Zhu, 2002; Jaleel *et al*., 2008).

Studies of Heikal *et al*. (2000), Ismail and Azooz (2002) revealed that salt tolerance of *Vicia faba* L. was correlated with higher accumulation of ionic and osmotic solutes in salt-tolerant than that of salt-sensitive plants. Differences in the accumulation patterns of Na+ and K+ were found under salinity stress. The salt tolerant plants maintained a high K+ content and higher K+/Na+ ratio compared with the salt sensitivity plants (Azooz *et al*., 2004; Rejili *et al.*, 2007). High K+/Na+ ratio is more important for many species than simply maintaining a low concentration of Na+ (Cuin *et al.*, 2003).

Salinity stress is known to trigger oxidative stress in plant tissues through the increase in reactive oxygen species (ROS). (Apel & Hirt, 2004. Salt stress induces a significant reduction in photosynthesis This reduction depends on photosynthesizing tissue (leaf area) and photosynthetic pigments (Dubey, 2005; Raza *et al*., 2006). The production of ROS can be particularly high, when plants are exposed to salinity stress (Athar *et al*., 2008; Ashraf, 2009). ROS cause chlorophyll degradation and membrane lipid per oxidation. So, malondialdehyde (MDA) accumulation as product of lipid per oxidation and chlorophyll retention are two oxidative stress indicators that are tested tools for determining salt tolerance in plants (Yildirim *et al.*, 2008). To scavenge ROS, plants posses specific mechanisms, which include activation of antioxidant enzymes (Jaleel, *et al*., 2008) and non enzymatic antioxidants such as, carotenoids and ascorbic acid (Mittler, 2002). Salt tolerance has been found to be positively associated with a more efficient antioxidant system (Mittler, 2002; Noreen & Ashraf, 2008). A correlation between the antioxidant enzyme activities and salinity tolerance was demonstrated by comparison of tolerant cultivar with sensitive cultivar in several plant cultivars. These activities were reported to increase under salinity stress and closely related to salt tolerance of many plants (Azevedo Neto *et al.*,2006; Athar *et al.*, 2008).

Faba bean is an important legume crop as a major source of protein and occupies large area of cultivated land in Egypt. Cultivation of faba bean leads to increase of soil nitrogenous compounds (Hungria &Vargas, 2000). Mohamed and Elbead, (2013) found that some physical and chemical properties changes when water pass through magnetic field .Therefore, the so called "magnetized water" has different chemical and physical properties and action than ordinary water. Salt stress is measured as one of the most important a biotic factors limiting plant growth and productivity of crops (Sairam and Tyagi, 2004). The water treated by pass during a magnetic device is named magnetized water. The physical and chemical properties of magnetized water have a series of changes which produce special functions (Dandan and Shi, 2013). Magnetic water improved the plant growth characteristics and nutrients uptake in tomato and soybean (Carbonell et al., 2011 and Radhakrishnan and Kumari, 2012). Osman et al. (2014) concluded that the magnetic water technique led to improve crop yield productivity, providing greater physical support to the developing shoot, better root growth.

Therefore, the main objective of this study, concentrated in seed soaking and magnetic water treatment to increase relatively salt tolerant of crop plants

MATERIALS AND METHODS

Two winter field experiments were carried out at El-Ismailia Research Station, El-Ismailia Governorate ,for two successive winter seasons, (2012\2013 and 2013\2014), to study Salt Stress Mitigation by Seed

Soaking and Magnetically water treatment technology . Particle size distribution (%) of the studied soil is recorded in Table (1) and initial chemical analysis of the studied soil and well water is shown in Tables 2&3 .

Table (1): Particle size distribution (%) of the studied soil profile.

Particle size distribution (%)				Soil texture class	$CaCO_3$ (%)
Coarse sand	Fine sand	Silt	Clay		
60.3	7.2	21.1	11.4	sandy loam	10.9

Table (2) : chemical analysis of the initial studied soil profile

Depth layer (cm)	pH	Ec(dS\m)	sp	Anions(meq.\L)			Cat ions(meq.\L)			
				HCO3	CL	SO4	Ca	Mg	Na	K
0-10	7.9	5.8	22	4.66	28.72	29.32	26.5	19.8	14.16	2.24
10 -20	8.2	3.3	22	5.04	13.36	14.66	12.5	7.41	11.25	1.9
20 -30	8.0	2.5	22	6.18	10.52	8.34	8.0	6.41	9.45	1.18

Table (3): Chemical analysis of well water.

EC (dSm^{-1})	Cations ($meq.L^{-1}$)				Anion ($meq.L^{-1}$)			PH	RSC ($meq.L^{-1}$)	Adj. SAR.
	Ca^{2+}	Mg^{2+}	Na^+	K^+	HCO_3^-	CL^-	SO_4^{2-}			
6.74	15.45	19.45	32.9	0.37	2.59	43.7	21.88	7.63	-	22.4

To fulfill this experimental eight treatments, i.e.saline irrigation water ,fungi, yeast, mixture from fungi + yeast, vinass,mixture from vinass + fungi , mixture from vinass +yeast and mixture from fungi +vinass + yeast. 500 gram of seed Faba Bean seeds (vicia faba L.,c.v.Giza 717) were soaked in 2000ml.of respective solution from previous treatments for 2 h. after that inoculated with El-Aqadien (Rayzobium bacteria) of nitrogen fixers. Chemical properties of Yeast ,Fungi , Venass and Biotwl. are given in Table (4).

Table (4) : Some Chemical properties of Yeast ,Fungi , Venass and Biotwl.

Properties		Yeast	Fungi	Venass	Biotwl
Protein	(g\L)	33.07	3.7	16.4	20.9
Fats	(g\L)	2.53	0.32		
Ash	(g\L)	7.97	0.96		
Cellulose	(g\L)	4.44	3.92		
Glycogen		7.67			
Total Nitrogen	($g.kg^{-1}$)			1.07	1 .96
Total P.	($g.kg^{-1}$)			0.21	0,38
Total K.	($g.kg^{-1}$)			4.36	70.1
Organic matter	($g.kg^{-1}$)			483.2	621.4

The experimental designed in a split - split plot design with three replicates, for each treatment was applied as follow:

1- Magnetic iron ore (MIO)

contained 4.3%SiO_2 48.8% Fe_2o_3 4,17.3% Feo, 26.7% Fe_2o_3 , 2.6% Mgo and 0.3% Cao.

2-Mixture ores

contained 2.13% N.,11%P.,5%K.,12.5%S,0.2%.Fe..0.2%Mn.,and0.1% Zn. ,both Magnetic iron ore and Mixture ores were obtained from El-Ahram company for mining and natural fertilizers (ECMNF),Giza ,Egypt.

3-Biotwl

contained0.98%N.,0.45%P.,0.96% ,0.07%Fe.,0.39%Mn.,0.17%Zn.and some bacteria strains of salt tolerant obtained from Soil, Water and Environment Research Institute, ARC, Giza, Egypt.

The plot consisted of 7 rows, each 3m long with 0.5m apart giving a plot area of about 10.5 m^2 Then irrigated with well water as drib irrigation system. While yeast was applied as foliar spray at a rate of 5 % and Biotwl was applied as foliar spray at a rate of 1.5 %. Once after 30,45 and 60 days respectively from sowing.

The following treatments were applied :

A: Main plots (Soil amendments.)

1- soil application with Mixture of ores at a rate of 200 $kgfed^{-1}$ (without Magnetic iron ore (Control).

2- soil application with Magnetic iron ore at a rate of 150 $kgfed^{-1}$.

B: Sub main plots (seed soaking)

1- Control (seed soaking with saline water)

2- Soaking with fungi suspended at a rate of 5%

3- Soaking with yeast suspended at a rate of 5%

4- Soaking with fungi + yeast suspended

5- Soaking with vinasse solution at a rate of 1.0 %

6- Soaking with vinasse + fungi suspended

7- Soaking with vinasse + yeas suspended

8- Soaking with vinasse + fungi + yeast suspended

C: Sub - Sub main plots (applied as foliar spray)

1- Yeast

2- Biotwl

The experimental recommended dose of N,P and K, which used 61 kg ammonium nitrate,33.5 % N, 200kg Super phosphate (15%P_2O_5)and 50 kg Potassium sulphate (48 %K_2O) were applied and P applied before planted, while K. was applied after 35 day from planting. At the end of each season, at harvest (150 days after sowing),number of branches\ plant and seed yield (kg fed^{-1}.) were recorded. Germination(%) was determined using the formula:

Germination(%)= No. of plants that are grown \ No. of seeds that were planted × 100.

Plant height was determined using the formula:

Plant height = The total length of the plants\ The total No. of plants × 100 .

The average No. of branches was determined using the formula:

The average No. of branches =Total branches of all plants \ The total No. of plants × 100 .

Soil samples were collected from each plot and analyzed for the following properties which recorded in Table (5).

Table (5) List of published method used in the determined properties.

Property	Publishers
▪ Particle size distribution (%).	Gee and Bauder (1986)
▪ Bulk density (Mgm^{-3}).	Vomocil (1965)
▪ Penetration resistance	Davidson (1965)
▪ Saturated hydraulic conductivity.	Klute and Dirksen (1986)
▪ Total calcium carbonate (gkg^{-1}), ▪ soil reaction (pH) and EC ($dS\ m^{-1}$) ▪ Soluble cations and anions ($m.mol\ L^{-1}$)	Page et al., (1982)
*soil moisture characteristics	Stakman (1966)

RESULTS AND DISCUSSION

Effect of application of magnetic Iron ore in soil on Soil salinity (Electrical conductivity)ECe content.

The movement of soluble salts in the soil depends mainly on its texture,structure,total porosity and permeability. Treatment magnetic water play an active role in improving salt movement and leaching process. Data in Table (6) show the effect of both magnetic iron ore and mixture ores (control) on ECe of sandy loam soil under irrigation with saline water. Data indicated that the mean values of soil ECe after two seasons decreased with magnetic iron ore application compared with untreated soil. This may be attributed to the treatment magnetic water by magnetic iron ore , which reduces the viscosity as a result of a shortage in sizes molecule and lack of bonding angle for 105 lead to easily water penetrate the soil and speeds of salt washing process. These results are in agreement with those obtained by(Stafford 1996,Colic et al. 1998,and Ahmad 2009.)

The same trend was observed in the mixture ores, while the shortage rate were higher than that magnetic iron ore used.

Table (6) : chemical analysis of the studied soil profile after harvesting two seasons (combined analysis).

Treatments	Depth layer (cm)	pH	Ec (dSm^{-1})	Anions($mmolL^{-1}$)			Cations($mmolL^{-1}$)			
				HCO_3^-	CL^-	$SO^-_4{}^2$	Ca^{+2}	Mg^{+2}	Na^+	K^+
Mixture ores (Control)	0-10	7.95	4.52	4.0	16	24.7	20.5	11.5	11.8	0.90
	10 -20	8.25	3.90	4.0	19	15.32	15.1	8.1	14.2	0.92
	20 -30	8.32	3.50	5.0	16	13.16	12.4	8.5	12.4	0.86
Magnetic iron ore	0-10	7.6	2.36	.2.1	12.0	9.52	11	6	6.2	0.42
	10 -20	8.0	3.37	3.1	17.5	12.13	13	9	9.6	1.13
	20 -30	7.9	3.11	2.5	15.5	12.51	9	13	7.9	0.61

Figure(1) shows the molecular shape of the water and how oxygen atom linked with two atoms of hydrogen and the amount of the angle between them, knowing that the sources indicated different values slightly to the amount of this angle, it is either 104 ° or 104.45 ° or 105 ° or 105.03 °, where Figure (2) How to go water molecules in one direction after the water passes through the magnetic field of a certain density of the iceberg (Stafford, 1996 and Ahmed, 2009)

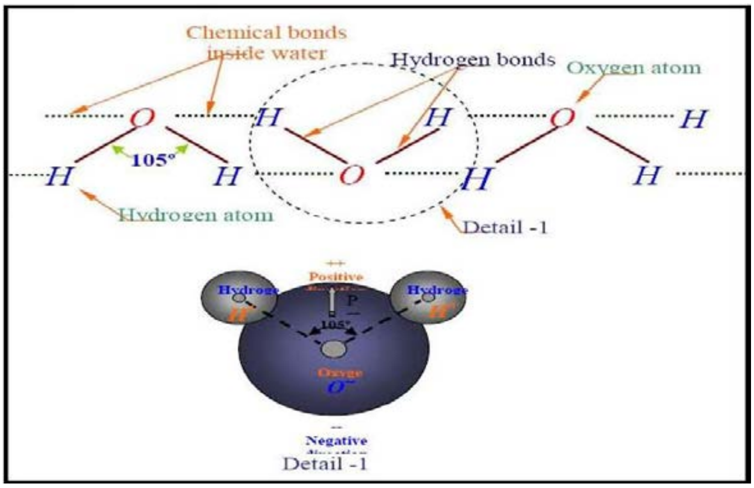


Fig.(1)

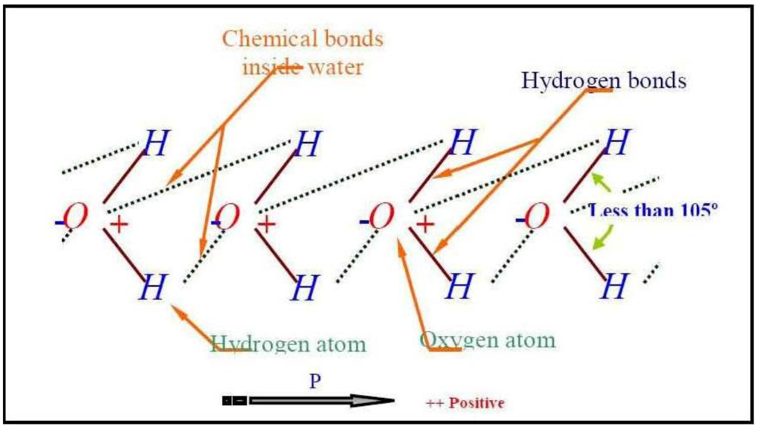


Fig.(2)

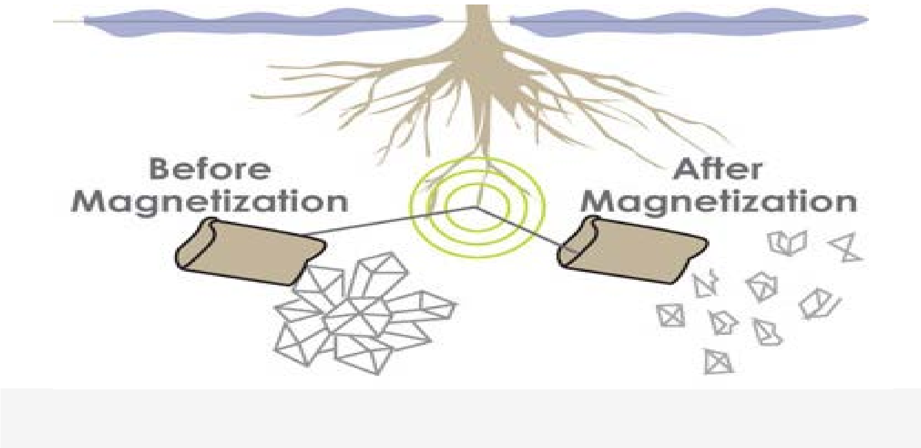
Effect of application of magnetic Iron ore in soil on Soil pH values (soil reaction):

Data in Table (6) clear that the application of magnetic iron ore to sandy loam soil decreased soil pH values under irrigation with saline water after two seasons. The decrease of soil pH could be attributed to treatment magnetic water by magnetic iron ore restructuring of the crystalline for followed by a change in some of the properties of the water , private pH and increasing permeability (Duffy 1977 , Hasson and Bramson 1985 and Harrison 1993).

Effect of application of magnetic Iron ore in soil on Soluble cations:

Soluble Cations especially (Na,Mg,Ca) as influenced by the application of Magnetic iron ore in sandy loam soil under irrigation with saline water. Data in Table (6) show that soluble Na, Mg and Ca are decreased by applying magnetic iron comparing with addition of mixture ores. This decrease of soluble cations could be attributed to magnetic water by magnetic iron ore which works to increase the solubility of salts from the soil pores(Marty nova et al. 1967and Busch et al. 1986)

Magnetic systems are cracking large crystals into small crystals, to pass easily through the capillaries plant roots and pores of the soil, therefore the amount of salt in the water, not less, but do not be harmful, because the plant will take everything it needs for growth of this type of water, and is throw the rest of the crystals salts to drainage(Image 1) Martin, 2003 ,Hassan et al., 2005 and Fahd et al., 2005.



Image(1): Effect of magnetization water on fragmentizing salts atoms

The water treatment magnetically reduce the angle of interdependence between the two atoms of oxygen and hydrogen in a molecule of water from 104 to 103 degrees, and that this shift in the corners makes a molecule of water collects in smaller groups, and this little assembly leads to better absorption of water through the walls of the cell as a result of reducing the pressure surface area (Rao, 2002), making it easier to penetrate the water processor magnetically cellular membranes (Colic et al., 1998) and for better absorption of water and faster access to the root cells and the consequent increase in the absorption of nutrients(Hilal and Hilal, 2000a & b and Rao, 2002)

Effect of application of magnetic Iron ore in soil on ESP% content.

Data presented in Table (7) showed that exchangeable sodium percentage (ESP) values without application magnetic Iron ore(control) with soil tend to be higher in the soil, being 2.96 % for soil, While, after application magnetic Iron ore , ESP % values decreased and reach about of 0.89 % with relative decrease (69.9 %) .

The results showed that use of magnetic irrigation water good ability to remove the negative effect of the exchangeable sodium percentage, on the structural properties of soil . This is may be attributed to magnetically water processor has led to increased washing power for sodium ions causing a reducing the rate of exchangeable complex

This is agreement with obtained by Abd-El-maged (2012).

Effect of application of magnetic Iron ore in soil on Physical properties:

The data presented in Table (7) show effect of magnetic iron ore on the values of bulk density, Hydraulic conductivity (cm h^{-1}),soil penetration and total $CaCO_3$of sandy loam soil under irrigation with saline water. The data reveal that the magnetic iron ore application decrease in the bulk density values and consequently decreased of soil penetration, hydraulic conductivity and total $CaCO_3$comparing with control (mixture ores). This may be attributed to the treatment magnetic water lowers the viscosity of the water as a result of the lack of size of water molecules and the lack of angle bonding 105 (Stafford 1996 and Ahmad 2009)

In addition, the lack of angle correlation makes molecules of water collects in smaller groups making it easier to force the process of soil which increases the permeability of the soil and creates pores for the passage of the water, which reduces the bulk density of the soil and thus reduce the penetration resistance in soil (Colic et all 1998).

Table (7):Effect of Magnetic iron ore application on physical and chemical properties of the experimental soil site after harvesting two seasons(combined analysis).

Components and characteristics		Mixture ores (Control)	Magnetic iron ore
Moisture content	%	7.22	9.82
Hydraulic conductivity	(cmh^{-1})	1.08	1.89
Soil penetration	($kgcm^{2}$)	3.6	1.8
Bulk density	(Mgm^{3})	1.66	1.60
Field capacity	(%)	4.7	5.23
wilting point	(%)	1.19	1.35
Available water	(%)	3.51	3.88
chemical properties			
ESP	(gkg^{-1})	12.8	7.9
CaCO3	(gkg^{-1})	1.82	1.59
pH	(1-2.5)	7.3	7.5
Ec	(dSm^{-1})	4.82	2.43

Effect of application of magnetic Iron ore in soil moisture retention in soil :

The phenomenon of the water retention by soil against external forces has long been recognized as one of the primary functions of the soil. Results of soil moisture at both field capacity and wilting point as well as available water content in sandy loam soil under irrigation with saline water are listed in Table (7) Field capacity and wilting point were affected by magnetic iron ore application .Also, data showed that application of magnetic iron ore was more effective than control (mixture ores application) this is because the magnetic water treatment works on restructuring crystallizes in the water, leading to a change in some of the qualities (Chechel and Annen Kova 1972).

Effect of application of magnetic Iron ore in soil growth parameters:

1- At 15 days from sowing:

Avaliable data presented in Fig.(3) show that the highest significant values of germination % at 15 days from sowing were recorded by magnetic iron application under irrigation with saline water, compared to mixture ores.

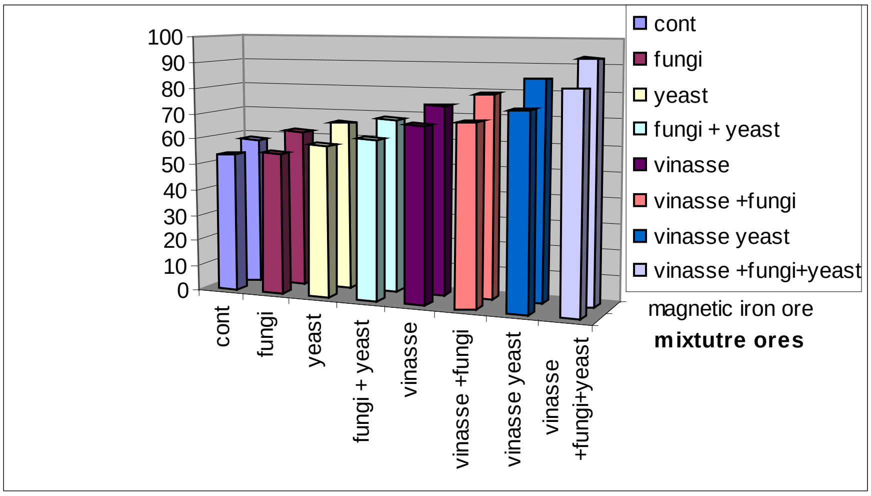


Fig.(3): Effect of Seed Soaking treatments, Magnetic iron ore and Mixture ores(control) on germination (%) characters of Faba bean at 15 days age

On the other hand, magnetic iron ore application gave the highest germination % that can be arranged discerning as follow:

vinasse + fungi + yeast > vinasse + yeast > Vinasse+ Fungi > Vinasse > fungi + yeast > Yeast > Fungi > Control. The beneficial effect of magnetic water treatment may be attributed to the effect of ions activation and polarization of dipoles in living cell. Magnetic water can alter the plasma membrane structure and function. Such findings are in agreement with Tai et al. (2008) who observed that on subjecting water to magnetic field, it leads to modification of its properties, as it becomes more energetic and more able to flow which can be considered as a birth of new science named Magneto biology.

2- Vegetative growth:

Overall, irrigating with magnetic water treatment significantly increased the vegetative growth (shoot parameters) of faba bean at 90 days age . Results in Tables (8,9) show that the plant height and branches number as well as seed yield (kgfed^{-1}.) was increased with magnetic iron ore than those grown with mixture ores in both seasons.

Table (8) : Effect of Magnetic iron ore application on the growth characters of faba bean at 90 days age for two seasons (combined analysis).

Treatments of Soaking solution	No. of branches						Plant height (cm)					
	Mixture ores (control)			Magnetic iron ore			Mixture ores (control)			Magnetic iron ore		
	Biotwl	Yeast	Mean	Biotwl	Yeast	Mean	Biotwl	Yeast	Mean	Biotwl	Yeast	Mean
Control	3.0	2.67	2.84	3.5	3.0	3.25	33	30	31.5	35	33	34
Fungi	3.5	2.33	2.92	4.0	3.1	3.55	36	31	33.5	40	34	37
Yeast	4.0	2.5	3.25	4.53	3.5	4.02	40	35	37.5	43	38	40.5
fungi + yeast	4.3	2.45	3.38	4.47	3.6	4.04	41	37	39	43	40	41.5
Vinasse	4.5	3.0	3.75	4.6	3.5	4.05	43	39	41	45	41	43
vinasse + fungi	4.5	3.0	3.75	5.7	3.66	4.18	44	38	41	46	42	44
vinasse + yeas	5.03	4.0	4.52	4.5	4.82	4.66	45	40	42.5	48	43	45.5
vinasse + fungi + yeast	5.6	4.5	5.05	6.4	5.3	5.85	50	44	47	54	48	51

Table (9) : Effect of Magnetic iron ore application on seed yield (kgfed^{-1}.) characters of *Faba bean* at 90 days age after two seasons (combined analysis).

Treatments of Soaking solution	Mixture ores (control)			Magnetic iron ore		
	Biotwl	Yeast	Mean	Biotwl	Yeast	Mean
Control	815	561	688	950	676	813
Fungi	830	674	752	980	863	921.5
Yeast	867	732	799.5	929	809	869
fungi + yeast	888	748	818	952	803	877.5
Vinasse	1175	1102	1138.5	1304	1210	1257
Vinasse + fungi	1180	1110	1145	1340	1230	1285
vinasse + yeas	1200	1130	1165	1390	1290	1340
vinasse + fungi + yeast	1390	1280	1338	1470	1315	1392.5

The beneficial effect of magnetic water treatment may be due to the influence of ions activation and polarization of dipoles in living cell. Magnetic water can alter the plasma membrane structure and function. Such results are in accordance with Mohamed (2013) who found that magnetic water improved fresh and dry weights of tomato plant compared to control. It appears that utilization of magnetized water technology may be considered a promising technique to improve tomato yield productivity. He also, concluded that the use of magnetic techniques with low quality water is very important for irrigation without any expected problems in the soils and plant.

Concerning foliar application of Biotwl or Yeast , results showed that foliar spray of Biotwl gave the highest values of plant height , branches and seed yield about foliar spray of Yeast . This may be attributed to the nutritional values that are present in soluble components organic vital fertile (Biotwl) as well as directly or indirectly influence the physiological activities of plant growth and development, through their regulatory effects on production of gibberellins in plant tissues(Waller and Nowaki 1978), (El-Ghamry et al.2009 and Mahmoud 2011). This Addition to Kronenberg (2011) found that polar property of water molecules help to dissolve many substances, and attributed this ability that solute molecules crash bonds hydrogen for some water molecules. Also, makes irrigation water magnetically processor increases the readiness of the nutrients in the soil, which increases plant growth.

CONCLUSION

1- Based on the aforementioned discussion, it could be conclude that the Seed soaking in the previous solutions, especially in the solution component of vinasse + fungi + yeast with the presence of magnetic iron ore in soil and Biotwol spraying led to an improvement of some chemical and physical properties of the light soil as well as increasing productivity

2- More studies on magnetic iron ore in the aspects as follows :-

* The possibility of replacing the magnetic iron ore for magnetization device of water

* The maximum period can continue the influence of magnetic iron ore in the soil.

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تخفيف الاجهاد الملحى عن طريق نقع البذوروتكنولوجيا معالجة المياه مغناطيسيا

صبحى فهمى منصور ، محمد رضا محمود ، عصام جوده ابو العلا و سهام يوسف محمد ابو ستيت
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فى مسعى جاد لتخفيف من حدة المشاكل التى تلازم الإنتاج الزراعي مثل نقص المياه والتصحر والملوحة----تم تقييم بعض المعالجات الممكنه على التربة والبذور٠ وقد اجريت تجربه حقليه لتحقيق الهدف الرئيسى من هذا البحث بمحطة بحوث الاسماعيليه بمحافظة الاسماعيليه خلال موسمى (٢٠١٢\٢٠١٣),(٢٠١٣\٢٠١٤) بهدف تحديد أفضل معالجة ممكنة لتحسين خواص الارض الرمليه الطمييه وزيادة إنتاجيتها من محصول الفول البلدى صنف جيزة ٧١٧ تحت نظام الرى بالتنقيط بمياه آبار ملحية، بإستخدام نقع البذورفى بعض المحاليل المختلفه فى مكوناتها لمدة ٢ ساعه قبل زراعتها كلا على حده بتركيز(٥٠٠ جم بذور\ ٢ لترمن المعلق او المحلول) وتتمثل هذه المحاليل فى :-

١- نقع البذور فى ماء مالح (ماء البئر)
٢- نقع البذور فى معلق من الفطريات بتركيز ٥ %
٣- نقع البذور فى معلق الخميره بتركيز ٥ %
٤- نقع البذور فى معلق من الفطريات والخميره
٥- نقع البذور فى محلول الفيناس بتركيز ١ %
٦- نقع البذور فى معلق من الفيناس والفطريات
٧- نقع البذور فى معلق من الفيناس والخميره
٨- نقع البذور فى معلق من الفيناس والفطريات والخميره

ويعد الانتهاء من النقع تم تلقيحها ببكتريا الريزوبيم (العقدين) ثم زرعت فى وجود الماء فى التربه التى تم اضافة خام الحديد المغناطيسى (المجناتيت) لها بمعدل ١٥٠ كجم\ فدان(لمغنطة المياه) و مقارنتها بالتربه التى اضيف اليها مخلوط الخامات بمعدل ٢٠٠ كجم\ف(كمعاملة كنترول) وقد اشارت النتائج المتحصل عليها على :-

اضافة خام الحديد المغناطيسى (المجناتيت) ادى الى تحسن فى بعض الخواص الطبيعيه و الكميائيه فقد ذادت قيم المحتوى الرطوبى للتربه ؛الماء الميسر؛ التوصيل الهيدروليكى المشبع وعلى النقيض انخفضت قيم كل من الكثافة الظاهرية ، اندماج التربه؛ كربونات الكالسيوم الكليه وحموضة وملوحة التربة وكذا النسبه المئويه للصوديوم المتبادل بالتربه مقارنة بالكنترول علاوه على ذلك فقد ادى الرش بالبيوتول مع معاملة خام الحديد المغناطيسى اعلى القيم للمحصول (١٤٧٠ كجم\ف) مقارنة الرش بالخميره سواء مع خام الحديد المغناطيسى او مخلوط الخامات (معاملة الكنترول)

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