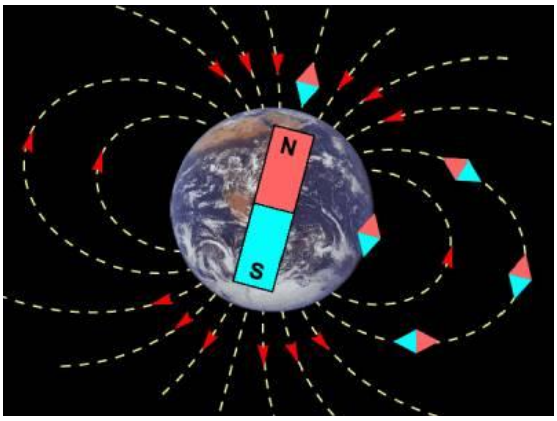
Practical Magnetology



MAGNETIC

TECHNOLOGIES

in Agricultural Sector

Author Biography

About Author.

Professor Yuri Tkachenko
Patriarch Scientist and Inventor, Chief Scientific Officer



Professor Yuri Tkatchenko founded Magnetic Technologies and is the Chief Scientist behind the technology, responsible for continuous innovation, technology research development and technical coordination.
An acclaimed academic in Russia, Professor Tkatchenko has been associated with 52 leading scientific institutes involved in magnetology-related research activities. Professor Tkatchenko has co-authored over 500 studies into ecology, agriculture, construction, industry, thermal power, food biotechnology, medicine and natural and waste water. He was awarded the title of Professor in 1992 by decision of the Scientific Council of the Russian Academy of Science, and has been honored with numerous government decorations, including the Order of Alexander Nevsky and the Order of the Maltese Cross.
Professor Tkatchenko is a graduate of Leningrad Polytechnic Institute, with a specialization in Power Engineering (Thermal Energetics).

Dedicated to Valentin Stepanovich Patrasenko - my teacher, peer and a colleague. May his soul rest in peace!

“If a person has a dream, he’s half way there, because a dream is a huge magnet that attracts all the circumstances necessary for its implementation”.

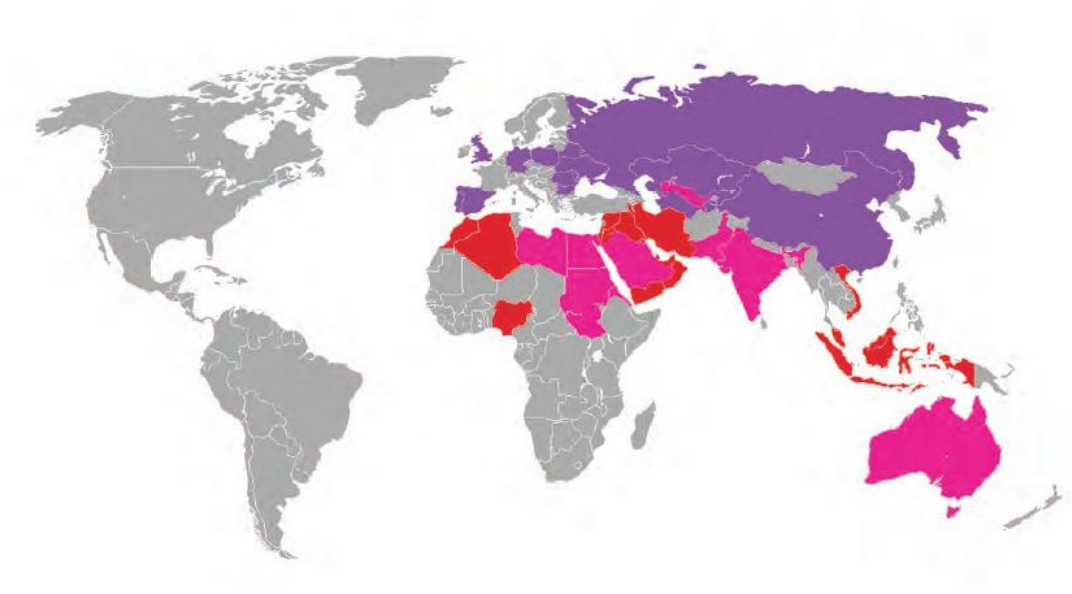
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About Magnetic Technologies LLC

Magnetic Technologies was established in 1994, based in Dubai UAE with offices and representatives in Asia, Africa and South-East Asia (Australia, Bahrain, Cyprus, Eritrea, Iraq, Saudi Arabia, Kuwait, Lebanon, Nigeria, Pakistan, Qatar, Sudan and India).

We have developed proprietary technology that harnesses the natural energy found in permanent magnetic fields to create customized solutions for worldwide use in agriculture, energy, municipality and leisure. We have a strong, 20 year track record of success and have proven our results in numerous trials, tests and farm applications globally.



reports on applications of magnetic technologies

researhes and applications of magnetic technologies

active applications of magnetic technologies

Benefits of Using Magnetic Technologies

Agricultural Benefits

Following years of extensive scientific research, we have created magnetic technologies to enhance agricultural resources, resulting in multi-fold commercial and environmental benefits:

- 30-50% reduction in seed usage.
- 15-30% increase in crop yield and better quality produce, some crops double.
- Reduction of vegetation period by up to 15 days.
- Doubles shelf life of produce (given the same storage conditions).
- Reduction in use of fertilizer by up to 50%.
- 30-50% reduction in water used for irrigation.
- Enables soil desalination.
- Allows to use of brackish water for irrigation.
- Minimizes use of pesticides and herbicides.

Animal Breeding

Magnetized drinking water has the following effect on animals:

- Significant reduction of morbidity and mortality.
- Increase of average daily gain by 15-30%.
- Increase in milk yield and milk fat.

Poultry Farming

- Increase in egg production.
- Increase in average daily gain of weight.
- Significant reduction of morbidity and mortality.

Fish Farming

- Fish growth doubles.
- Water reservoirs can be used for irrigation.
- Significant reduction of morbidity and mortality.

Water Reservoirs

- Neutralize pathogenic bacteria.
- De-gazation of unpleasant smell.
- Reduction of weighed particles.
- Increase amount of dissolved oxygen in water.
- Kills mosquitos and flies.

Introduction to Magnetology

The magnetic field (MF) is a special form of matter in motion, which enables communication and interaction between the flows of electric charges. MF is forces of attraction of moving opposite charges and one-directional currents and vice versa, repulsive forces of moving same charges and multidirectional currents. Magnetic properties of various substances, including members of body tissues, are determined by rotation of electrons in their orbits and the inner aspect of their motion (spin). It is this movement of electrons which characterizes a value of a magnetic moment. With respect to MF substances can be divided into diamagnetic and paramagnetic. In diamagnetic substances (some metals - bismuth, silver, and nonmetals - sulfur, carbon, water, most organic compounds, in particular - the carbohydrates and proteins) the magnetic moments of electrons have opposite directions, mutually offset and do not form total magnetic moment of the atom or molecule. Substances belonging to the tissue of a living organism belong to of diamagnetic group. Magnetic permeability of different tissues is close to unity, i.e. almost comparable to that of vacuum. In this regard, as previously thought, an external magnetic field does not exert selective effects on different tissue structures.

With the development of industrial production, science, astronautics and so on people are increasingly exposed to the biological MF action on living organisms.

Accumulated in biological science data strongly supports the use of permanent magnetic fields. Even some authors recommend an alternating magnetic field that controls biological processes.

Magnetism is a universal phenomenon of the world around us which determines living conditions and life itself on Earth. Having mastered the secret of an artificial magnetic field, mankind can now restore the earth's ecological balance.
In March 1820 Danish physicist Oersted discovered a magnetic effect of the electrical current. Then in October of the same year a French physicist Argo used this phenomenon to produce manmade permanent magnets. Since then man have accumulated vast experience of applied use of permanent magnets.
If in Oestered's experiment a magnetic field is defined by a current then in a substance treated with a magnetic device we obtain electric current with the help of magnetic fields of permanent magnets.

Our planet earth is surrounded by an electrical field. It is almost like its surface and its ionosphere act as giant covers of a spherical capacitor, hence life originated in a continuous electrical and therefore magnetic field. Life emerged and continues to develop under its constant exposure.

Theory of Magnetic Systems Processes

When liquid is mobile in a magnetic field, then its charged particles will be affected by a Lorentz force; which is perpendicular to the direction of charged particles and to direction of a magnetic field:

$$F=q*[v \times B],$$

q- electrical charge
B- vector of magnetic induction
V- vector of speed

Specific speed and magnetic induction initiate a change in a structure of liquid. This is called magnetic-hydro-dynamic resonance.

Therefore using relatively small energy of permanent magnets, it is possible to significantly change structure of liquid - i.e. initiate second-order phase transition.
As a result of this transition (changes structure without altering natural condition of substance) properties of liquid significantly change.

Increase of some basic properties of water:

- **Viscosity of 3-4%.**
- **Surface tension by 10-13%.**
- **Electrical conductivity by 7-26%.**
- **Optimal heat capacity by 3-4%.**
- **Latent heat by 10-40%.**
- **Magnetic susceptibility by 200-450%.**

Grain Production
Fruit and Vegetable Farming
Green Houses

Magnetic Treatment in Crop Production

Benefits:

- Decrease in vegetation period.
- Better quality yield.
- Restoration of dry lands.
- Increase in yield.
- Reduction in seed/planting material usage.
- Lower risk of plant disease.
- Less water usage.
- Ability to use brackish water for irrigation.
- Reduction in fertilizer use.

The use of magnetic technology in crop production is completely safe for humans, plants and animals. Not only it is natural, it is also highly beneficial and can increase seed germination, harvest volume and nutrient content of any crops.

The application of magnetic systems for crop production can be divided in 2 phases:

1. **Magnetizing of irrigation water.**
2. **Magnetizing the seed material.**

The following section contains reports of multiple applications of magnetic technologies. It also describes its benefits in crop production and devices used.

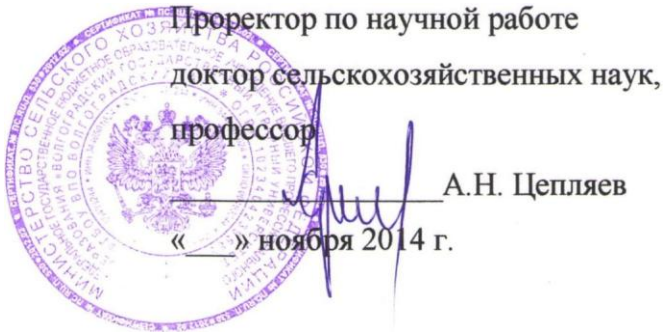
Practical Results

Ministry of Agriculture
Russian Federation
Federal State Educational Establishment
Higher Professional Education
Volgograd State Agricultural University

Department of Horticulture, breeding and seed

УДК: 635.1/8 : 537.622

APPROVED:
Vice President for Research
Doctor of Agricultural Sciences,
Professor
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"_17__" November 2014



REPORT
on scientific - research
"Recognising the effective influence of magnetic water on growth of vegetable crops using intensive technology of cultivation in protected ground"

Head of the research project
Head of the Department of Horticulture, breeding
and Seed, candidate of agricultural Sciences

I.Y. Podkovyrov

Volgograd, 2014

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Conclusion and proposals

Literature

Introduction

Volgograd region is the largest donor region for production of vegetable crops. Areas used for crops can vary slightly from 28.7 to 31.7 thousand hectares, and the volume of production is more than 820 thousand tons per year. In order to increase the efficiency of vegetable growth, optimization of the use of resources of irrigation systems is needed to reduce agricultural costs.

To increase productivity and improve product quality of irrigated areas, adaptation of technologies to the conditions of each area is needed. In this respect, we should consider watering plants using magnetized water, obtained by passing a stream through a constant magnetic field.

By its parameters magnetized water is close to the physiological fluids of plant tissues. Magnetic water is structured water. It is not made up of large and small liquid crystals (clusters) typical to ordinary water, instead it is made of separated individual molecules. As a result, it increases solubility of magnetized water and increases its physiological activity in plant tissues. It also facilitates penetration of water and dissolved in it ions through membranes and cell walls.

The use of magnetic water for irrigation enables to significantly reduce its consumption and increase yields of crops in drought conditions.

Relevance of the topic is related to the need of integration into modernized intensive technologies for vegetable growth of magnetic systems using magnetic water for irrigation. Magnetic technologies were developed in the 70s-80s, when a positive effect of magnetized (structured) water on the growth and development of plants was discovered. With the introduction of new irrigation technologies, resource management, change in irrigation regime, it became a necessity to study the effect of

magnetization of water on the growth and yield of vegetables. This is the novelty of the research.

1. Program and method of research

1.1. Research Program

The purpose of this research was to study the effect of magnetic water with different salt concentrations on the growth and productivity of vegetable crops under protected conditions.

The program includes the following research questions:
1. Study of physiological activity of magnetic water on vegetable crops.
2. Identify the effect of magnetic water on quality of seedlings, plant growth and development in protected grounds.
3. Effect of magnetized water on quality and yield of vegetable crops.

1.2. Research Methodology

Objects of research are hybrids of spring onion (Banko) and lettuce (Teremok, Gurman).

Two experiments were carried out in order to determine the effect of magnetic water. First, on seed germination inside petri dishes with magnetized and non-magnetized (ordinary) water. Second, irrigation of plants using magnetized and non-magnetized (ordinary) water.

The following methods were used in research:

In laboratory conditions to determine germination rate (according to GOST R 52171-2003), rate of germination in solutions of different concentrations. The rate of germination is determined in accordance with GOST 24933.0-81. Experiments inside greenhouse were based on methods for vegetable growth developed by B.M. Markov and M.A .Tibrovoy (1956). The experiment carried out in accordance with the requirements of the methodology of experimental work (BA Armor, 1979).

For the experiments inside a greenhouse designed by 'Agrisogaz', two systems were constructed for water magnetization produced by 'Magnetic Technologies' Dubai. Vegetable seeds were initially magnetically treated by passing them through a magnetic field using a special funnel.

The experiment was conducted during the period from 14.08.2014 until 15.11.2014.

Seeds were planted inside containers mounted on racks of a greenhouse. Irrigation is carried out using non-magnetized tap water (control) and magnetized tap water (test). Enriched with peat soils are used as a substrate. Experiments required to replicate high salinity conditions, irrigation solution is prepared using tap water with sea salt and macro-nutrients, needed for plant nutrition. Experiments were carried out in three replicates.

Expected results

1. To show a positive effect of magnetic water on growth, development and productivity of vegetables of different groups.
2. To identify the possibility of using saline water for irrigation of vegetable crops.
3. To identify the positive effect using magnetic water on ground's salt content.

Table 1 Experiment of using magnetized saline water for irrigation

Experiment variables	Spring Onion 'Banko' variety F1	Tomato 'Kalista' variety F1
Tap water (control)	***	***
Magnetized tap water	***	***
Magnetized water with salt concentration 3 g/l	***	***
Magnetized water with salt concentration 4 g/l	***	***
Magnetized water with salt concentration 5 g/l	***	***
Magnetized water with salt concentration 6 g/l	***	***

* repetition of experiment



Funnel for seed magnetization



Seed magnetization



Device for water magnetization



Experimental greenhouse

Figure 1 - Experimental conditions

2. Physiological activity of magnetic water in vegetable crops

The main objective of crop production is adequate water supply, especially in hot dry climates. Knowledge of physiological basis of water regime enables to properly develop correct methods of water supply to plants and to select necessary equipment for management of water supply. Absorption of water by plants occurs at microscopic nano level by different structures of the cell. Water is the most important substance as it is involved in all physiological processes.

Water binds cells and tissues together, it is involved in the sequencing and structure of membrane structures. It acts as a solvent and takes part in many biochemical processes. During photosynthesis, it acts as a donor for electrons and protons, used for restoration of biosynthesis. Its molecules are involved in oxidative processes.

Inside plant tissues, magnetized water can be found in free and bound states. Free water is characterized by high mobility and is free of impurities. Bound water has limited mobility and serves as a solvent. It is bound by osmotic, colloidal and capillary ineractions. The number of bound ions with magnetized water inside the leaves can be quite large, as indicated by the high water retention capacity of leaves.

To determine that, a specific type of lettuce was selected, since its leaves have no specific protective mechanisms on the surface and dry out quickly due to loss of water. Irrigation of plants using magnetized water enables its molecules to easily bond and form chains, preventing its evaporation during stress conditions.

Lettuce varieties (Teremok and Gurman) were irrigated using magnetized and ordinary water. Lettuce leaves were picked in the morning hours in order to determine its water-holding capacity, wilting point and the rate of recovery of rigidity in tissues of plants enriched with ordinary and magnetized water.

Table 2 The effect of magnetic water on indicators of water regime of lettuce leaves

Indicators of water regime in leaves	Magnetized water		Ordinary water	
	'Teremok' variety	'Gurman' variety	'Teremok' variety	'Gurman' variety
Total content of water in leaves, %	83.4	85.1	82.9	85.3
Water retention ability, %	89.7	83.8	80.4	78.15
Turgidity, %	86.6	84.3	74.5	79.2
Water deficit, %	11.5	9.9	13.2	13.6
Speed of recovery of turgidity, min	45	50	75	90

Plants form bonds between moisture in the soil and inside tissues. Lack of water in the soil attributes to wilting of the plant, accompanied by a variety of other physiological disorders. Wilting plants have higher temperatures in leaves, weaker photosynthesis, lower nutrient utilization and delayed growth processes. Even short term wilting has negative consequences to the plant. This is illustrated by the long term effect of a slower growth rate in a wilting plant; even after normal water supply is restored, it takes a long time to reverse this process.

According to the theory of photosynthetic productivity, all processes of plant activity are provided with energy by photosynthesis. Quantitative characteristics of this process depends on a number of factors (environmental temperature, light conditions, etc.). However one of the most important factors is the physiological condition of water in the tissues, as its molecules are involved in providing hydrogen atoms. The initial materials needed for the process of photosynthesis are: 6 molecules of carbon dioxide, 12 molecules of water and 2,826 units of energy (joules). Increase in photosynthetic activity of vegetable crops is considered as an increase in its productivity.

The amount of pure productivity of photosynthesis in lettuce and spring onion was determined using different methods of plant irrigation, i.e. using magnetized water and ordinary water. The average differences between crops of pure product of photosynthesis, were small and accounted to g / day. However, both crops revealed the positive effect of magnetic water on the product of photosynthesis (Table 3).

Table 3 The effect of magnetized water on photosynthesis productivity in vegetable crops

Crop	Increase in dry weight. kg	Leaf area, м^2	Efficiency of photosynthesis g of dry substance per 1 m2 of leaf surface per day
Полив омагниченной водой			
Lettuce 'Termok'	0.39	5.32	1.95
Lettuce 'Gurman'	0.41	4.74	2.31
Spring onion 'Banko' F1	0.33	2.81	3.14
Полив обычной водой			
Lettuce 'Termok'	0.30	4.78	1.67
Lettuce 'Gurman'	0.31	3.56	2.32
Spring onion 'Banko' F1	0.26	2.69	2.58

Pure productivity of photosynthesis indicates the quantity of total dry biomass formed by plants during the day per 1 m2 of leaves. Average productivity of leaves for the whole growing season can be determined by dividing the weight of total biological yield by the index of photosynthetic capacity. This value is important in determining yield formation during the growing season and may vary in studied cultures between 1,95-3,14 g / m2 per day.

It should be noted that crops irrigated with magnetized water have higher photosynthetic productivity, due to a more favorable for physiological processes structure of water in the leaves.

3. Influence of magnetic water on germination of vegetable seeds

Early stages of ontogenesis in lettuce and spring onion plants are characterized by slower growth rate of vegetative mass and differentiation of organs. Using magnetic treatment has improved quality of seedlings in the experiments. Studies prove that magnetic treatment of seeds and its germination in magnetized water, using experimental magnetic system, has a positive influence on seedling growth (Table 4).

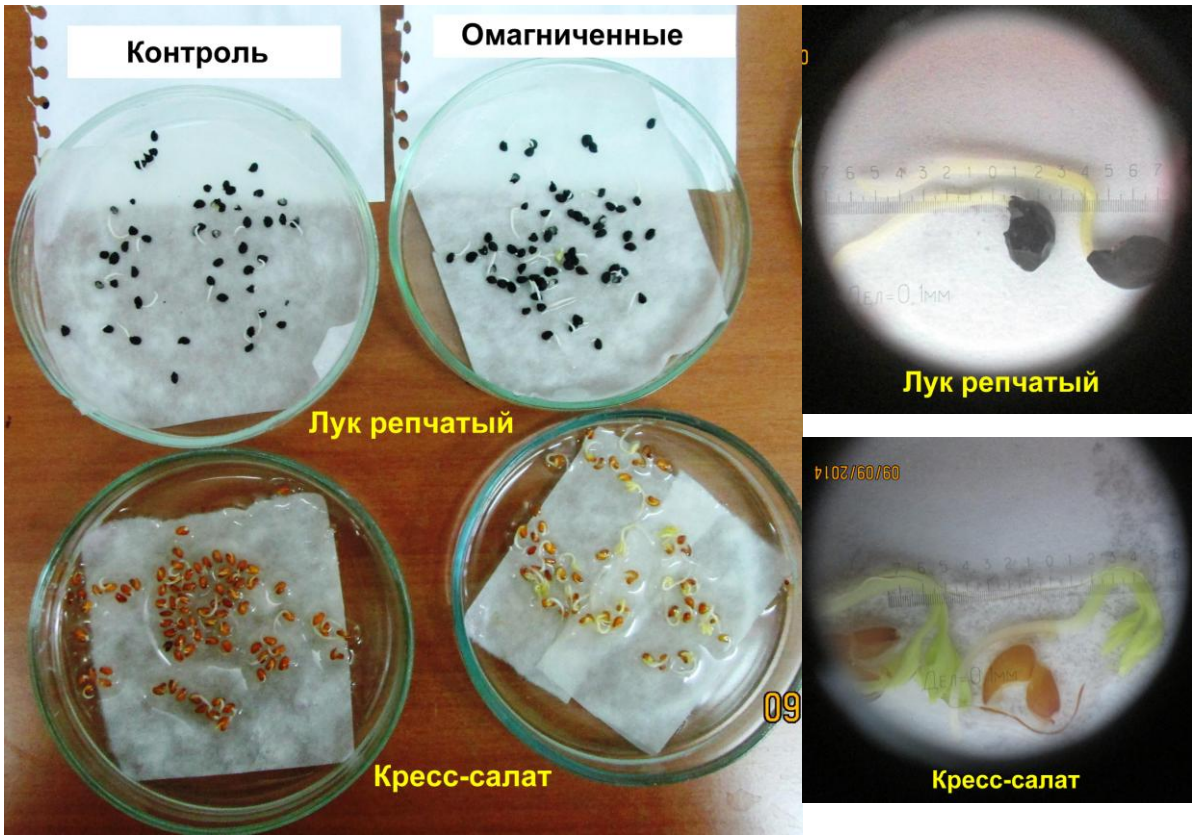
Table 4 The effect of magnetic treatment on the growth of seedlings of onion and watercress

Experiment variables	3rd day after sowing		5th day after sowing	
	Root length, mm	Stem length, mm	Root length, mm	Stem length (leaf), mm
Spring Onion				
Without magnetic treatment	2.2±0.09	-	12.6±0.37	16.8±0.42
With magnetic treatment	4.2±0.11	-	18.2±0.56	17.4±0.39

Excess over control, %	47.6	-	30.8	3.5
Water cress				
Without magnetic treatment	3.5±0.10	2.7±0.09	68.4±0.93	27.8±0.18
With magnetic treatment	5.2±0.13	3.6±0.11	95.8±1.87	33.3±0.21
Excess over control, %	32.7	25.0	28.6	16.5

The best results were observed in the first days of germination, when the root increases in size by 32.7% in watercress and 47.6% in spring onion. With further germination, the effectiveness of magnetic treatment starts to decrease.

Magnetic treatments is most effective when used to improve energy of germination of seeds with a dense shell (e.g. onions). Structured water better penetrates the fetus and activates cell division in embryonic root. As a result, this leads to the appearance equally germinated shoots. Seed germination occurs 1-2 days earlier which is especially important in arid climates (Figure 2).



Seed sprouts in laboratory conditions



Improvement in ground germination of water cress using magnetic treatment of seeds and water

Figure 2 - Seedlings of vegetable crops after magnetic treatment

4. Growth and yield of vegetable crops using irrigation with magnetized water

The study of growth processes in crops influenced by magnetically treated water enables to obtain the necessary data for the development of a system providing mineral nutrition and necessary moisture. Irrigation of plants using magnetic water leads to its increased growth, resulting in larger leaves, stems and aboveground mass (Table 5).

Table 5 The effect of magnetic treatment on growth of vegetable crops

Experiment variables	4-leaf stage		6-leaf stage	
	Length, cm	Mass above ground, g	Length, cm	Mass above ground, g
Spring onion				
Without magnetic treatment	15.6±0.67	0.20±0.01	18.3±0.13	0.41±0.02
With magnetic treatment	17.1±0.72	0.28±0.02	22.2±0.14	0.69±0.03
Excess over control, %	8.7	28.6	17.6	40.6
Lettuce				
Without magnetic treatment	8.2±0.07	1.19±0.03	17.0±0.11	2.8±0.12
With magnetic	9.3±0,08	1.52±0.02	19.6±0.13	4.5±0.63

treatment				
Excess over control, %	11.8	21.7	13.3	37.8
Tomato				
Without magnetic treatment	9.4±0.73	1.2±0.06	12.1±0.07	2.6±0.09
With magnetic treatment	11.9±1.87	1.7±0.07	16.6±0.09	4.1±0.11
Excess over control, %	21.0	29.4	27.1	36.6

The experiment has shown that under the influence of magnetic water, the intensity of growth processes increases. It also made evident the difference in plant growth between magnetically treated plants and those irrigated using ordinary water. Thus depending on the crop , increases by 13,3-27,1% and increases as the plant ages. Most importantly, magnetized water stimulates growth and development of the root system, which in turn positively affects the growth of the above surface part of the plant and develops strong plants.

Leaf surface area in green crops grows rapidly only in favorable growing conditions with an air temperature of 18-22 C and a high level of mineral nutrition. Lack of macronutrients and low temperatures, cause stress and can greatly reduce the effectiveness of magnetic water. Therefore, the greatest effect is observed using intensive cultivation technologies and high levels of agricultural technologies(Figure 3).



'Teremok' variety 'Gurman' variety

Figure 3 - lettuce plants grown using magnetic water and ordinary water

As a result of this research, yield of salad from 1m2 was on average 2.1 kg and had the highest yield increase in combinations of irrigation with structured water and

sowing magnetically treated seeds by 23.2% compared to control. The lowest yield was in control plots without magnetic treatment, 1.79 kg / m2 (Table 6).

Table 6 - The yield of green crops using structured water for irrigation

Crop	Урожайность с 1 м², кг		Excess, %
	Irrigation using ordinary water	Irrigation using magnetized water	
Lettuce 'Teremok'	1.79	2.33	23.17
Lettuce 'Gurman'	1.88	2.45	23.26
Spring onion 'Banko' F1	1.54	1.97	21.83

The most responsive to irrigation with magnetized water was a crop variety 'Teremok". This modern variety can use nutrients more effectively during growth. "Gurman' crop variety was less responsive to water improvement method and had a maximum yield increase of 2.45 kg / m2.

Differences in the variants of the experiment were observed mainly during maturation stage of lettuce. In the initial stages of ontogenesis, lettuce had similar values of morphological parameters. At germination stage, plants feed on complex storage of embryonic substances and its consumption from ground is minimal. In phase 2-3 of fully grown leaves , the need for mineral elements is insignificant. Increase in size of lettuce plants as a result of using magnetic treatment had resulted in earlier maturation of products (Figure 4). "Teremok' crop variety was harvested 7 days earlier than control. Whereas 'Gurman' crop variety was harvested 5 days earlier. Also it was noted that lettuce growth rate is faster during autumn period. This is due to a more favorable thermal conditions in the protected ground.



Figure 4 – Experimented on lettuce leaves of 'Gurman' crop variety

Similar patterns are observed in the spring onions. On the basis of conducted experiments it can be concluded that structured water positively influences the development of lettuce and spring onions.

5. Growth of crops using magnetized water with high salt content for irrigation

Higher salt content of irrigation water and ground has a toxic effect on plants, resulting in poor growth and lower yield. Domestic and international experience using structured water for irrigation with high salt content show positive results in fruit growing and in growing crops for animal feed. In a protected ground on artificial substrates such studies to date have not been conducted. Thus making this experiment somewhat more interesting.

Irrigation of spring onion and tomatoes planted on peat soils, using saline solutions of 3 to 6 g / l, enabled to determine optimal salt concentrations for the tested cultures. The increase of the above ground mass of tomato and spring onion, under the influence of salts, was slower compared to control. Saline solutions made using magnetized water had less toxic effect and did not inhibit plant growth as much(Figure 5, 6).

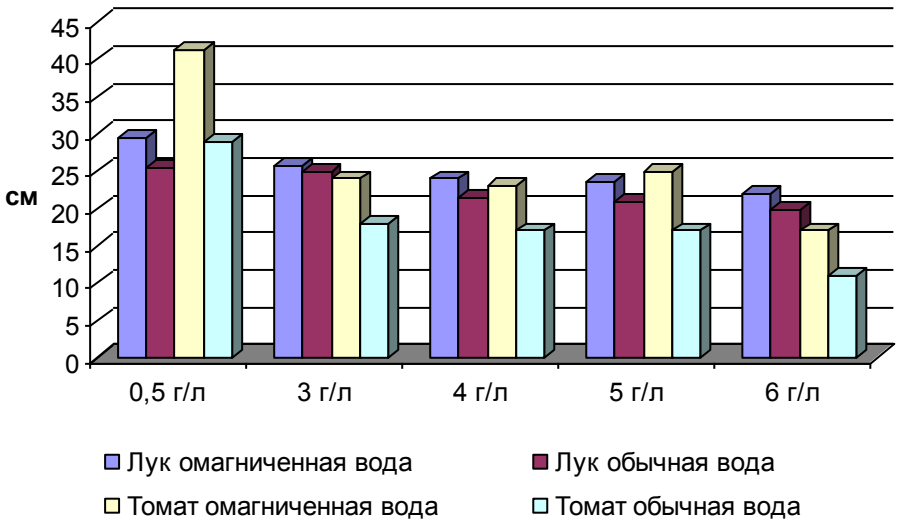


Figure 5 - The height of test tomato and spring onion plants
at various salt concentrations of the irrigation water

IT was observed that spring onion was less responsive to the salt content of irrigation water, compared to tomato plant. Water structured using magnetic field, increases salt tolerance of a crop, but reduces plants' overall productivity by around 12,5-25,1%. Significant growth inhibition occurs at a concentration of salt of more than 6 g / l. Acceptable salinity of irrigation water, provided it is magnetized, must not exceed 5 g / l when growing tomatoes and spring onions.



Figure 6 – Spring onion plant after irrigation with salty water

Conclusion and suggestions

1. Magnetic devices for water and seeds treatment, made by 'Magnetic Technologies LLC' Dubai, can be recommended for a wide range of use in agriculture as it proves to be highly effective in increase of crop yield.
2. Magnetized water has a high physiological activity, resulting in an increase in pure photosynthetic productivity of plants and improvement of water regime in leaves. This reduces the effects of stress from drought and lack of light in extreme conditions of growing vegetables without significantly reducing productivity. It can be recommended to irrigate plants using magnetized water in drought conditions in order to increase water retention of leaves and to support its biological activities.
3. Magnetic treatment of seeds prior to sowing followed by irrigation using magnetized water, increases germination rate, improves quality of seedlings and reduces germination time by 1-2 days. These methods accelerate the development of plants in the early stages, which reduces the time needed to obtain yield by 7-10 days.

   It is recommended to soak vegetable seeds before sowing in magnetized water for 10-12 hours to activate its germination.

4. The use of water, structured by using magnetic field, during vegetation and yield formation stages of green crops (lettuce, spring onion) leads to an increase in yield at protected conditions when grown on peat soil by around 21.8-23.2%. Also timely execution of complex agricultural activities (feed, irrigation, etc) also has a positive effect.
5. Irrigation water with high salt content is recommended to undergo a magnetic treatment using devices made by 'Magnetic Technologies' Dubai, to reduce its toxic effect on vegetable crops. Total crop productivity using saline water for irrigation is reduced by 12.5-25.1%, however magnetic treatment of water enables to increase productivity of crops by 3.1-11.4%.
6. In protected ground, it is recommended to use irrigation water containing toxic salts not to exceed a concentration of 5 g / l and to use magnetic devices during irrigation.
7. It is not recommended to irrigate soil and sprouts using water with salt content (more than 3 g / l) as it leads to the death of seedlings. Use of saline water is possible during growth and ripening stages, when the adaptive capacity of plants is higher compared to seedling stage.

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APPROVED:
Vice President for Research
Doctor of Agricultural Sciences,
Professor
_____ A.N. Tseplyaev
"_17__" November 2014

Protocol of experiments No. 6 from 17.10.2014
Name of Institution: Biotechnological laboratory of agriculture, department of horticulture, breeding and seeds, Volgograd

Address: 400002, Volgograd, Universitetskii, 26
Name of equipment: device for watering plants with magnetized water.
Commissioner: Magnetic Technologies LLC, Dubai
Experiment date: from 14.08.2014 to 15.11.2014
Results of experiments: Experiments using a device for watering plants with magnetized water were carried out on lettuce, water cress, tomato and spring onion plants, inside 'Agrisogas' greenhouse.

Proven that magnetization of seeds and its germination inside magnetized water, derived using mentioned above device, has a positive effect on growth of seedlings (Table 1).

Table 1 The effect of magnetic treatment on growth of seedlings of spring onion and water cress

Experiment variables	3 days after sowing		5 days after sowing	
	Root length, mm	Stem length, mm	Root length, mm	Stem length (leaf), mm
Spring onion				
Without magnetic treatment	2.2±0.09	-	12.6±0.37	16.8±0.42
With magnetic treatment	4.2±0.11	-	18.2±0.56	17.4±0.39
Excess over control, %	47.6	-	30.8	3.5
Water cress				
Without magnetic treatment	3.5±0.10	2.7±0.09	68.4±0.93	27.8±0.18
With magnetic treatment	5.2±0.13	3.6±0.11	95.8±1.87	33.3±0.21
Excess over control, %	32.7	25.0	28.6	16.5

The best result was observed within the first days of germination, when a root increases in size by more than 32.7% in water cress and 47.6% in spring onion.

Irrigation of plants using magnetized water leads to its increased growth, which is reflected in the increase of leaf size, stem and above ground mass (Table 2).

Table 2 The effect of magnetic treatment on growth of vegetable crops

Experiment variables	4-leaf stage		6-leaf stage	
	Length, cm	Mass above ground, g	Length, cm	Length, cm
Spring onion				
Without magnetic treatment	15.6±0.67	0.20±0.01	18.3±0.13	0.41±0.02
With magnetic treatment	17.1±0.72	0.28±0.02	22.2±0.14	0.69±0.03
Excess over control, %	8.7	28.6	17.6	40.6
Lettuce				
Without magnetic treatment	8.2±0.07	1.19±0.03	17.0±0.11	2.8±0.12

With magnetic treatment	9.3±0,08	1.52±0.02	19.6±0.13	4.5±0.63
Excess over control, %	11.8	21.7	13.3	37.8
Tomato				
Without magnetic treatment	9.4±0.73	1.2±0.06	12.1±0.07	2.6±0.09
With magnetic treatment	11.9±1.87	1.7±0.07	16.6±0.09	4.1±0.11
Excess over control, %	21.0	29.4	27.1	36.6

A difference in plant growth is observed among plants irrigated using ordinary and magnetized water. Depending on the crop it can vary by 13,3-27,1% and increases as the plant ages.

A device for irrigation of plants with magnetized water can be recommended for a wide range of use in agriculture as it proves to be highly effective during experiments.

Head of the research project
Head of the Department of Horticulture, breeding
and Seed, candidate of agricultural Sciences

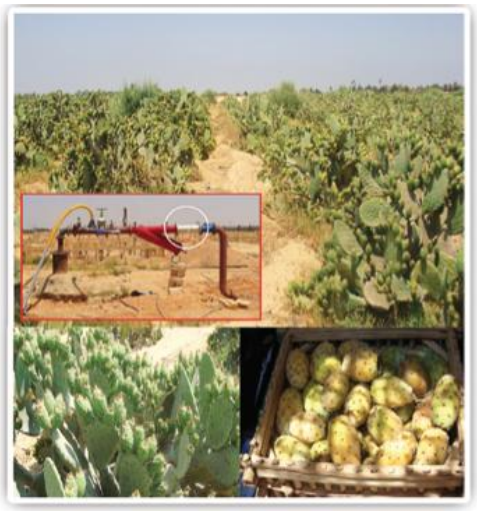


I.Y. Podkovyrov

Egypt. Farm using regular irrigation



Egypt. Farm using magnetic irrigation



Egypt. Farm using regular irrigation

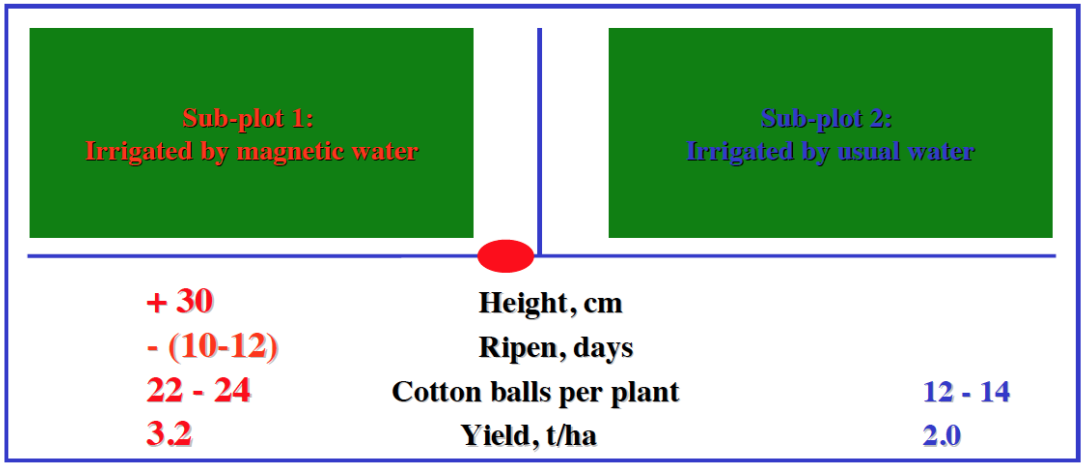


Egypt. Farm using magnetic irrigation



Egypt. Farm using magnetic irrigation

Extract from a report by the Institute of Water Problems
Academy of Sciences of the Republic of Uzbekistan: The use of magnetic technology for irrigation of cotton.



Testing of magnetic systems for cotton irrigation have demonstrated the high effectiveness of magnetic treatment. The use of magnetic equipment does not require maintenance or specialized staff training, no energy expenditure during use. A proposed wide range of applications by Magnetic Technologies LLC can significantly enhance the scope of irrigated crop.

Application of magnetic technologies using brackish water for irrigation in arid and semi-arid ecosystems.

M. M. Selim
Field Crops Research Department,
National Research Centre,
Cairo, Egypt
Seasons 2002/2003 – 2004/2005

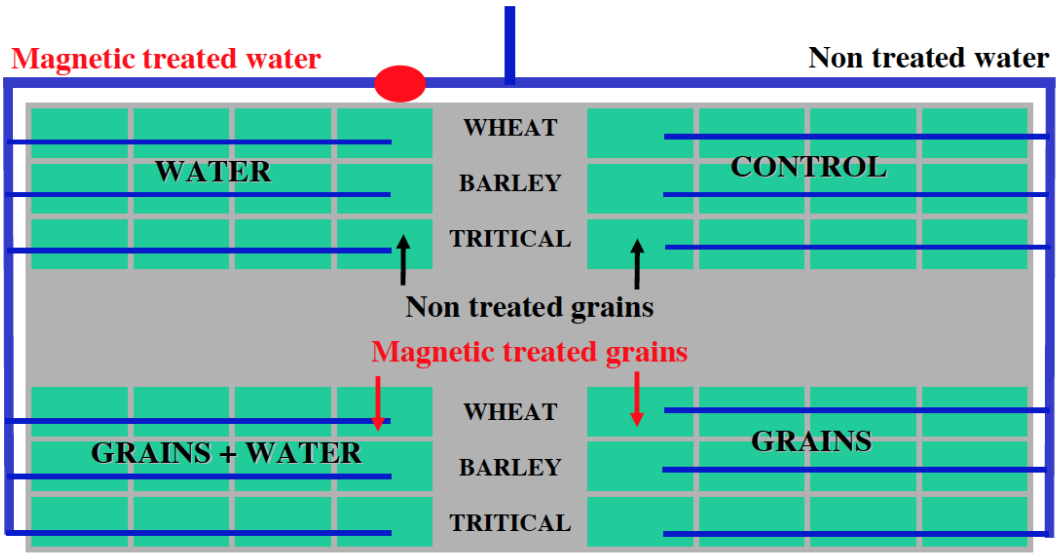
Soil Parameters

SOIL DEPTH, cm	pH	SALINITY		PARTICLE SIZE DISTRIBUTION, %				TEXTURE	$CaCO_3$	OM
		EC, dS/m	%	SAND		SILT	CLAY		%	
				COARSE	FINE					
0-30	8.6	15.0	0.96	78.2	15.1	3.3	3.4	Sand	12.3	1.45
30-60	9.1	13.5	0.87	80.9	12.4	4.0	2.7	Sand	7.0	1.11

Water Parameters

SALINITY		pH	CATIONS, meq/L				ANIONS, meq/L				SAR	RSC
TDS, ppm	EC, dS/m		Ca^{++}	Mg^{++}	Na^{+}	K^{+}	CO_3^{--}	HCO_3^{-}	Cl^{-}	SO_4^{--}		
4330	6.46	8	14.67	11.37	37.42	1.1	0.0	11.47	31.05	22.11	10.37	-14.6

Diagram of Test Field



Effect of magnetic treatment on seed germination (National Research Centre, Egypt)

MAGNETIC TREATMENT	CROP	GERMINATION PERCENTAGE					
		LABORATORY			FIELD		
		6 days	9 days	12 days	6 days	9 days	12 days
CONTROL	Wheat	34	50	70	65	70	86
	Barley	40	60	80	69	80	86
	Tritical	56	72	80	76	64	86
GRAINS	Wheat	56	70	88	68	76	88
	Barley	60	76	92	74	82	94
	Tritical	64	78	96	79	84	92
WATER	Wheat	60	78	84	68	79	90
	Barley	70	80	88	73	82	92
	Tritical	74	80	88	78	86	95
GRAINS + WATER	Wheat	78	100	100	66	84	95
	Barley	76	100	100	75	84	95
	Tritical	80	100	100	80	89	96

Effect of magnetic treatment on crop yield (mean value of 3 seasons) Field Experiment. National Research Centre, Egypt

MAGNETIC TREATMENT	CROP	MICRONUTRIENT CONCENTRATION, ppm		
		Fe	Zn	Mn
CONTROL	Wheat	162	70	57
	Barley	140	72	60
	Tritical	144	73	58
GRAINS	Wheat	260 (60)	83 (19)	62 (9)
	Barley	197 (41)	80 (11)	68 (13)
	Tritical	154 (7)	78 (7)	64 (10)
WATER	Wheat	178 (10)	88 (26)	65 (14)
	Barley	174 (24)	79 (10)	67 (12)
	Tritical	170 (18)	84 (15)	77 (33)
GRAINS + WATER	Wheat	290 (79)	90 (29)	70 (23)
	Barley	210 (50)	88 (22)	72 (20)
	Tritical	214 (49)	84 (15)	77 (33)

Effect of magnetic treatment on crop yield (mean value of 3 seasons)
Field Experiment. National Research Centre, Egypt

MAGNETIC TREATMENT	CROP	YIELD COMPONENT PARAMETERS			YIELD, t/feddan	
		No of spike per m^2	Spike length, cm	No of grains per spike	GRAIN	BIOMASS
CONTROL	Wheat	119	6	25	1.248	2.483
	Barley	124	7	27	1.334	2.543
	Tritical	152	9	29	1.499	3.473
GRAINS	Wheat	150 (26)	7	30 (20)	1.360 (9)	2.843 (14)
	Barley	155 (25)	8	32 (19)	1.465 (10)	2.897 (14)
	Tritical	168 (11)	9	31 (7)	1.594 (6)	3.564 (3)
WATER	Wheat	160 (34)	7	35 (40)	1.387 (11)	3.045 (23)
	Barley	174 (40)	8	38 (41)	1.532 (15)	2.996 (18)
	Tritical	185 (22)	9	34 (17)	1.599 (7)	3.762 (8)
GRAINS + WATER	Wheat	190 (60)	8	39 (34)	1.432 (15)	3.245 (31)
	Barley	200 (61)	8	40 (48)	1.688 (27)	3.231 (27)
	Tritical	220 (45)	9	36 (24)	1.653 (10)	3.896 (12)

Economic Benefit

Purchase Price, USD/ton (2008)	469
Effect of magnetic treatment, ton/hectare	0.410
Price of magnetic device A600, USD	4,600
Yield, ton/field	0.510 x 40= 16.4
Revenue, USD	16.4 x 469= 7,691
Payback Period, season	4,600/ 7,961= 0.6
Net Profit, USD	7,961 – 4,600= 3,361

AGRICULTURE AND BIOLOGY JOURNAL OF NORTH AMERICA

Application of magnetic technologies for increasing yield of wheat

Mahmoud Hozayn
Agronomy Dept., Agric. and Biol. Div.,
National Research Centre, Cairo, Egypt
Amira Mohamed Saeed Abdul Qados
Botany Dept., Princess Nora Bint Abdul Rahman University,
Riyadh, KSA
Seasons 2008/2009 – 2009/2010

Application of magnetic treatment for increasing yield of wheat. Plant condition 55 days after seeding.

	2008/2009		t-sign	2009/2010		t-sign
	Untreated tap water	Magnetic treated water		Untreated tap water	Magnetic treated water	
Plant height (cm)	20.75	24.12	**	26.20	29.20	**
Fresh weight (g/tiller)	0.68	0.98	**	0.79	1.21	**
Dry weight (g/tiller)	0.17	0.23	**	0.21	0.29	**
Water contents (%)	75.00	76.53	ns	74.04	75.60	ns

* - *significant at the 0.05 level,*
** - *significant at the 0.01 level,*
ns - *non significant.*

Content of photosynthesis pigments, indole and phenol in wheat 55 days after seeding.

		Untreated tap water	Magnetic treated water	*t-sign*
Photosynthetic pigments (mg/100 g fresh weight)	Chlorophyll a	8.24	9.68	**
	Chlorophyll b	4.97	5.54	*ns*
	Chlorophyll a+b	13.21	15.22	**
	Carotenoids	5.67	5.84	*ns*
	Total pigments	18.88	21.07	**
Total indole (µg/100 g fresh weight)		2.94	9.80	**
Total phenol (mg/100 g fresh weight)		215.62	288.05	**

** - *significant at the 0.01 level,*
ns - *non significant.*

Yield of wheat and its components

	2008/2009		*t-sign*	2009/2010		*t-sign*
	Untreated tap water	Magnetic treated water		Untreated tap water	Magnetic treated water	
Plant height (cm)	39.80	47.00	*	56.40	59.60	*
Spike length (cm)	5.00	6.60	**	8.50	9.20	**
Spike weight (g)	0.48	0.53	**	0.64	0.75	**
Spikeletes (No/spike)	9.00	12.00	**	14.40	16.00	**
100-grain weight (g)	4.03	4.31	*ns*	4.14	4.42	*ns*
Grain yield (g/tiller)	0.30	0.40	**	0.75	0.97	**
Straw yield (g/ tiller)	0.59	0.80	**	0.93	1.06	**
Biological yield (g/tiller)	0.89	1.20	**	1.68	2.03	**

* - *significant at the 0.05 level,*
** - *significant at the 0.01 level,*
ns - *non significant.*

Results

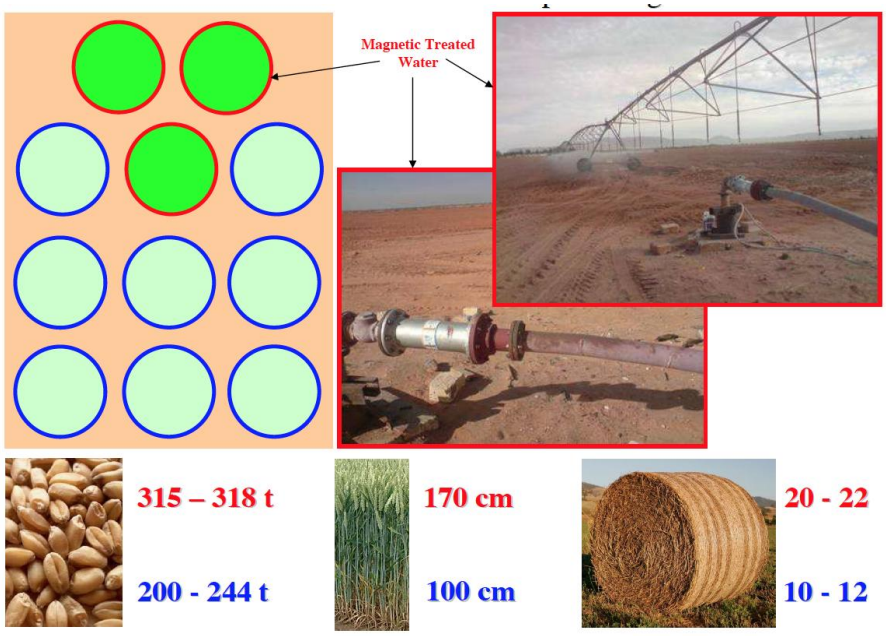
Irrigation with magnetic water had resulted in a significant increase in plant height, wet and dry mass, compared to control group. On average of 3 seasons, this increase was 13.85, 48.36 and 39.25%, respectively. It also resulted in a slight increase in water content (2.07%) compared to the control.

Magnetic water treatment significantly increased all
Photosynthetic pigments (Ch a, Ch b, Ch a and b, carotenoid and total content of pigment) compared to the control. An increase was17.6, 11.37, 15, 25.3. 03 and 15.25% respectively.

Magnetic water treatment demonstrated a considerable increase in total content of phenol and indole compared to the control group. Where phenol content increased by 33.59% and indole increase almost twice compared to control.

Irrigation of wheat using magnetized water greatly increased its yield and its parameters in comparison to the control group. Average growth for 3 seasons was 24.56, 31.33 and 27.68% in grain, straw and total biomass, respectively.

Lybia 2008. Wheat Production



A magnetic device was installed on a separate compartment of the irrigation system in order to show the difference between using magnetic and regular water for crop production. Plots of land and seeding conditions were very similar.

Result in Grain Yield

Plots irrigated with regular water	200 ton
Plots irrigated with magnetic water	244 ton

Result in Hay Yield

Plots irrigated with regular water	10-12 rolls
Plots irrigated with magnetic water	14-16 rolls

Economic Benefit

Purchase Price, USD/ton (2008)	469
Price of magnetic device A600, USD	4,600
Yield, ton/field	315 - 244= 171
Revenue, USD	71 x 469= 33,299
Payback Period, season	4,600/ 33,299= 0.138
Net Profit, USD	33,299 – 4,600= 28,699

Eritrea. Effectiveness of magnetic treatment for cabbage production.

	Magnetic			Control		
	Max	Min	Average	Max	Min	Average
Weight	1.9kg	1.2kg	1.7kg	1.1kg	0.7kg	0.98kg
Main Root Length, cm	5.8cm	3.4cm	4.53cm	5cm	3.2cm	4.03cm
Total Root Length, cm	25cm	12.1cm	16.1cm	16.2cm	10.8cm	12.65cm





Egypt. Synergetic effect of Nile- Fertile and magnetic treatment of wheat and tomatoes.

Treatments		Wheat yield, ton/fed		Tomatoes yield, ton/fed	
Water	Soil	Grains	Total	Ground	Climbing
Untreated	control	1.96	5.52	16.5	35.0
	Nile-fertile®	2.36	7.88	19.8	43.8
Magnetic treated	control	2.44	7.76	20.7	45.0
	Nile-fertile®	2.92	9.48	24.5	54.0

Tomato statistics.



Fertilizer +Water Treatment	Nile-Fertile® + MTW	NPK + MTW	NPK + NW
Yield, t/a	54	45	35

Effect of magnetic treatment on tomatoes and peppers.

D.A.Selim
Faculty of Agriculture
Minufiya University
Shibin El-Kom, Egypt

Some physical and chemical properties of used soil

SP, %	Particle size distribution <2 mm, %					pH	EC, dS/m at 25°C	Soil paste extract analysis meq/l							
								Anions				Cations			
	Coarse sand	Fine sand	Silt	Clay	Texture grade			$CO_2^=$	HCO_3^-	Cl^-	$SO_4^=$	Ca^{++}	Mg^{++}	Na^+	K^+
48.2	2.31	41.1	29	27.6	Clay loam	7.9	2.5	-	4.5	8.2	19.3	14.4	6.46	10.8	0.36

Seed germination of tomatoes and peppers
(Minufiya University, Egypt)

MAGNETIC TREATMENT	GERMINATION, %	MEAN LONG PERIOD OF GERMINATION, day	SPEED OF GERMINATION	GERMINATION INDEX	COEF. OF VELOCITY (CV%)
TOMATO SEEDS					
Control	85.000	7.041	5.051	5.633	14.268
Seeds	94.333	6.367	5.447	6.633	15.782
Water	100.000	6.259	5.477	8.033	15.991
Seeds + Water	100.000	6.567	5.422	6.900	15.234
PEPPER SEEDS					
Control	46.667	19.611	5.481	6.400	5.341
Seeds	83.333	16.522	7.504	11.900	6.206
Water	83.333	13.722	8.442	11.333	7.331
Seeds + Water	80.000	16.467	7.457	10.500	6.093

Effect of magnetic treatment on peppers
(Minufiya University, Egypt)

MAGNETIC TREATMENT	FRUIT WEIGHT (g)	No. FRUIT PER PLANT	FRUIT YIELD, g/plant	FRUIT YIELD, kg/m²	STRAW YIELD, g/plant	TITRATABLE ACIDITY, %	VIT. C, mg ascorbic acid per 100g fruit weight	TSS, %
FIRST SEASON								
Control	12.758	9	114.818	8.120	6.942	0.486	24.02	5.8
Seed	12.939 1	13 44	168.203 46	11.896 46	9.212 33	0.435	66.04 175	7
Water	20.385 60	21 133	428.083 273	30.275 273	8.628 24	0.469	60.06 150	6.8
Seed + Water	21.937 72	27 200	592.274 416	41.886 416	11.495 66	0.384	72.07 200	7.8
SECOND SEASON								
Control	12.566	10	125.66	8.887	4.194	0.653	48.05	6
Seed	19.550 56	22 120	430.1 242	30.417 242	6.877 64	0.576	60.06 25	7.8
Water	15.08 20	14 40	211.124 68	14.931 68	5.128 22	0.512	60.06 25	7.8
Seed + Water	20.016 59	25 150	500.40 298	35.80 303	14.442 244	0.512	120.12 150	8

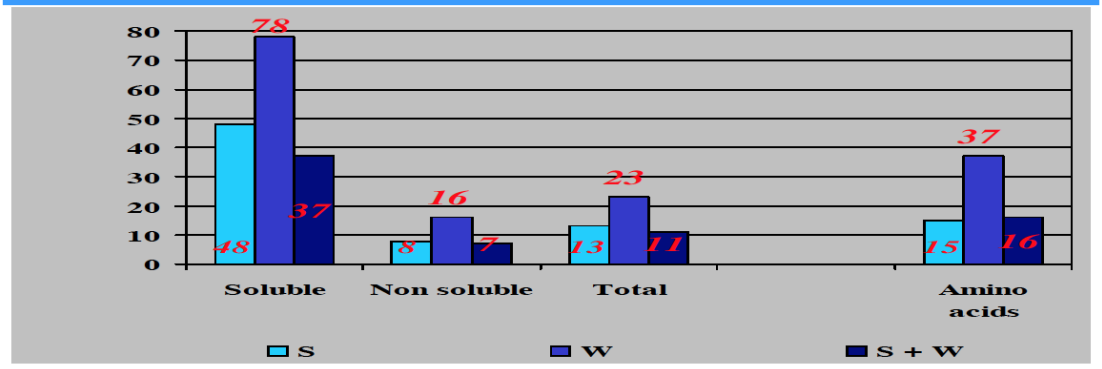
Efficiency (%) = (Magnetic Treatment – Control) / Control

Concentration of some elements in tomatoes and peppers after magnetic treatment.
(Minufiya University, Egypt)

MAGNETIC TREATMENT	NITROGEN, %	PHOSPHORUS, %	POTASSIUM, %	Fe, ppm	Zn, ppm	Mn, ppm
TOMATO FRUITS						
Control	1.40	0.615	1.84	191.2	24	126
Seed	1.65	0.623	1.88	366.0 91	26.5 10	137 9
Water	1.68	0.761	1.92	486.2 154	59.7 149	181 44
Seed + Water	1.45	0.695	1.97	379.8 99	37.5 56	170 35
PEPPER FRUITS						
Control	1.563	0.396	1.005	295.3	29.2	45
Seed	1.575	0.557	1.240	304.1 3	29.7 2	55.67 24
Water	1.875	0.514	1.082	305.1 3	33.0 13	56.33 25
Seed + Water	2.188	0.475	1.321	544.9 85	47.5 63	62.32 38

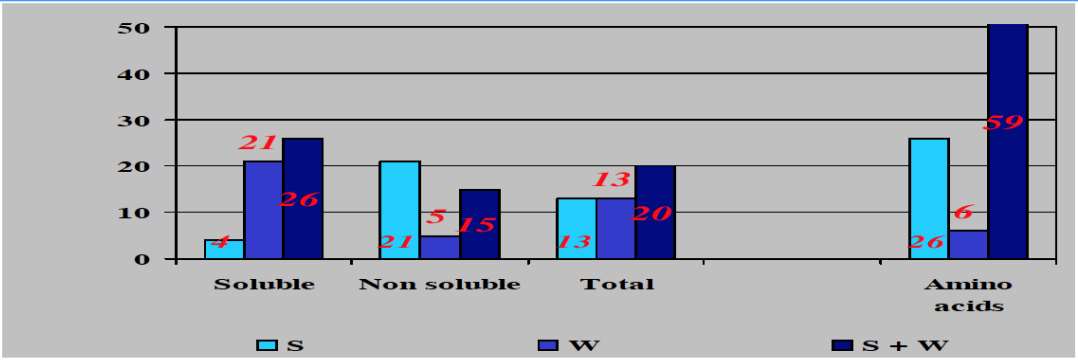
Effect of magnetic treatment on some chemical components of tomato fruits.
(Minufiya University, Egypt)

MAGNETIC TREATMENT	CARBOHYDRATES, mg/g of dry weight			TOTAL PROTEIN, %	AMINO ACIDS, mg/g of dry weight
	SOLUBLE	NON SOLUBLE	TOTAL		
Control	21.000	154.695	175.695	8.61	27.540
Seed	31.000	167.125	198.125	10.148	31.590
Water	37.375	179.188	216.563	10.302	31.800
Seed + Water	28.750	166.250	195.000	8.981	31.860



Effect of magnetic treatment on some chemical components of pepper fruits.
(Minufiya University, Egypt)

MAGNETIC TREATMENT	CARBOHYDRATES, mg/g of dry weight			TOTAL PROTEIN, %	AMINO ACIDS, mg/g of dry weight
	SOLUBLE	NON SOLUBLE	TOTAL		
Control	120.000	138.125	258.125	9.766	20.925
Seed	125.000	167.813	292.813	9.766	26.325
Water	145.000	145.625	290.625	11.719	22.140
Seed + Water	150.750	158.469	309.219	13.672	33.210



AGRICULTURE AND BIOLOGY JOURNAL OF NORTH AMERICA

Increase in yield and quantity of nutritional elements of Chickpeas.

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Botany Dept., Princess Nora Bint Abdul Rahman University,
Riyadh, KSA

Seasons 2008/2009 – 2009/2010

Condition of chickpea plants after undergoing magnetic treatment 55 days after seeding

	2008/2009		t-sign	2009/2010		t-sign
	Untreated tap water	Magnetic treated water		Untreated tap water	Magnetic treated water	
Plant height (cm)	20.40	23.60	*	24.20	26.20	ns
Fresh weight (g/plant)	1.39	1.58	**	1.55	1.73	**
Dry weight (g/plant)	0.32	0.35	ns	0.37	0.38	*
Water contents (%)	76.98	77.85	ns	75.93	77.93	ns

* - *significant at the 0.05 level,*
** - *significant at the 0.01 level,*
ns - *non significant.*

Content of photosynthesis pigments, indole and phenol in chickpeas 55 days after seeding.

		Untreated tap water	Magnetic treated water	*t-sign*
Photosynthetic pigments (mg/100 g fresh weight)	**Chlorophyll a**	5.72	7.24	**
	Chlorophyll b	3.07	3.74	**
	Chlorophyll a+b	8.79	10.98	**
	Carotenoids	4.48	4.50	*ns*
	Total pigments	13.27	15.48	**
Total indole (µg/100 g fresh weight)		9.00	9.80	**
Total phenol (mg/100 g fresh weight)		312.29	434.13	**

* - *significant at the 0.05 level,*
** - *significant at the 0.01 level,*
ns - *non significant.*

Condition of Chickpea plants after undergoing magnetic treatment 55 days after seeding

	2008/2009		*t-sign*	2009/2010		*t-sign*
	Untreated tap water	Magnetic treated water		Untreated tap water	Magnetic treated water	
Plant height (cm)	28.40	35.20	**	32.40	41.80	**
Brunches (No/plant)	2.47	3.23	**	3.20	4.40	**
Pods (No/plant)	6.60	8.81	*ns*	7.60	11.50	**
Pods weight (g/plant)	1.86	2.59	**	1.96	2.76	**
Seeds (No/plant)	6.89	9.50	**	7.13	10.20	**
100-grain weight (g)	18.16	19.03	**	19.13	19.17	*ns*
Seeds yield (g/plant)	1.36	1.77	**	1.43	2.10	**
Straw yield (g/ plant)	1.43	1.91	**	1.98	2.94	**
Biological yield (g/plant)	2.79	3.68	**	3.41	5.04	**

Results

Irrigation with magnetic water had resulted in significant results compared to irrigation with regular water, to an average ratio of 2 seasons: 11.98, 12.51, 5.76 and 1.88% by plant height, wet mass (g/plant), dry mass (g/plant) and composition of water.

Pigments of photosynthesis increased, total amounts of phenol and indole in comparison to control: 26.56, 21.83, 24.91, 42.00, 16.64, 39.22 and 8.66%.

Magnetic irrigation of chickpea plants had also increased yield and its common components. Average gain increase over 2 seasons was 38.64% in seeds, 41.03% in the straw and 39.85%.

WORLD APPLIED SCIENCES JOURNAL

Dynamics of growth of flax, its yield and its components. Increase in the content of some chemical elements during magnetic treatment.

Mahmoud Hozayn
Agronomy Dept., Agric. and Biol. Div.,
National Research Centre, Cairo, Egypt
Amira Mohamed Saeed Abdul Qados
Botany Dept., Princess Nora Bint Abdul Rahman University,
Riyadh, KSA
Seasons 2008/2009 – 2009/2010

Effect of irrigation with magnetized water on flax growth at 55 days after sowing

	2008/2009		t-sign	2009/2010		t-sign
	Untreated tap water	Magnetic treated water		Untreated tap water	Magnetic treated water	
Plant height (cm)	24.00	25.00	ns	26.20	28.26	**
Fresh weight (g/plant)	0.61	0.71	**	0.79	0.93	**
Dry weight (g/plant)	0.15	0.16	ns	0.21	0.24	ns
Water contents (%)	75.47	77.09	ns	74.10	74.19	ns

* - *significant at the 0.05 level,*
** - *significant at the 0.01 level,*
ns - *non significant.*

Content of photosynthesis pigments, indole and phenol in Flax 55 days after seeding.

		Untreated tap water	Magnetic treated water	t-sign
Photosynthetic pigments (mg/100 g fresh weight)	Chlorophyll a	6.13	7.20	**
	Chlorophyll b	2.36	3.96	**
	Chlorophyll a+b	8.49	11.16	**
	Carotenoids	4.60	4.99	ns
	Total pigments	16.98	22.32	**
Total indole (µg/100 g fresh weight)		1.20	1.59	**
Total phenol (mg/100 g fresh weight)		208.19	246.07	**

* - *significant at the 0.05 level,*
** - *significant at the 0.01 level,*
ns - *non significant.*

Condition of Flax plants and its components after undergoing magnetic treatment 55 days after seeding

	2008/2009		t-sign	2009/2010		t-sign
	Untreated tap water	Magnetic treated water		Untreated tap water	Magnetic treated water	
Plant height (cm)	56.80	58.20	*	58.30	61.40	**
Technical length (cm)	43.40	48.80	*	48.50	51.60	**
Based branches (No/plant)	2.40	2.80	ns	2.60	2.84	ns
Fruit branches (No/plant)	5.60	6.00	ns	6.20	6.44	ns
Capsules (No/plant)	9.20	10.80	ns	10.40	11.60	ns
Capsules weight (g/plant)	0.44	0.53	*	0.53	0.57	ns
Seeds (No/capsule)	8.00	8.40	ns	8.26	9.28	**
Seeds (No/plant)	73.60	90.72	**	85.68	107.46	**
100-seed weight (g)	0.68	0.70	ns	0.69	0.72	ns
Seeds yield (g/plant)	0.32	0.35	*	0.34	0.37	ns

Results

Irrigation with magnetic water of Flax had resulted in a significant increase in plant height, wet and dry mass and composition of water used for irrigation.
Average values for 2 seasons increased by 6.01, 16.62, 12.58 and 1.48% on the above listed indicators.

Magnetic water treatment noticeably stimulated pigments of chlorophyll a, chlorophyll b, chlorophyll a and b, carotenoids and total amount of phenol and indole. Percent increase the above parameters were: 17.46, 67.80, 31.45, 8.55, 31.45, 18.20 and 33.55%.

There was an increase in general parameters of yield: 3.98, 9.42, 12.95, 5.51, 14.46, 14.00, 8.67, 24.34, 9.10 and 3.64% (see table above). A positive effect was noted in the increase of protein synthesis in all the pigments of photosynthesis.

American-Eurasian Journal of Agricultural & Environmental Sciences

Increase in lentils growth and its components in greenhouse conditions using magnetic treatment.

Amira Mohamed Saeed Abdul Qados
Botany Dept., Princess Nora Bint Abdul Rahman University,
Riyadh, KSA
Mahmoud Hozayn
Agronomy Dept., Agric. and Biol. Div.,
National Research Centre, Cairo, Egypt
Seasons 2008/2009 – 2009/2010

Condition of Lentils after undergoing magnetic treatment 55 days after seeding

	2008/2009		t-sign	2009/2010		t-sign
	Untreated tap water	Magnetic treated water		Untreated tap water	Magnetic treated water	
Plant height (cm)	15.20	18.40	*	17.16	21.00	**
Fresh weight (g/plant)	0.56	0.66	**	0.67	0.79	*
Dry weight (g/plant)	0.17	0.19	**	0.24	0.27	ns
Water contents (%)	70.12	70.61	ns	64.18	65.49	ns

* - *significant at the 0.05 level,*
** - *significant at the 0.01 level,*
ns - *non significant.*

Content of photosynthesis pigments, indole and phenol in lentils 55 days after seeding.

		Untreated tap water	Magnetic treated water	t-sign
Photosynthetic pigments (mg/100 g fresh weight)	Chlorophyll a	3.71	4.22	*
	Chlorophyll b	1.25	1.80	*
	Chlorophyll a+b	4.96	6.02	*
	Carotenoids	4.77	4.90	ns
	Total pigments	9.92	12.04	*
Total phenol (mg/100 g fresh weight)		179.18	215.02	**
Total indole (µg/100 g fresh weight)		0.83	2.06	**

* - *significant at the 0.05 level,*
** - *significant at the 0.01 level,*
ns - *non significant.*

Condition of Lentil yield and its components after undergoing magnetic treatment 55 days after seeding

	2008/2009		t-sign	2009/2010		t-sign
	Untreated tap water	Magnetic treated water		Untreated tap water	Magnetic treated water	
Plant height (cm)	16.40	20.60	**	23.20	25.60	*
Brunches (No/plant)	2.71	3.60	*	3.32	3.92	*
Pods (No/plant)	4.78	6.40	**	6.76	8.40	**
Pods weight (g/plant)	0.63	0.72	*	0.74	0.88	**
Seeds (No/plant)	8.75	10.50	**	10.66	12.34	**
100-seeds weight (g)	5.20	5.62	**	5.45	5.69	**
Seeds yield (g/plant)	0.52	0.66	**	0.63	0.78	**
Straw yield (g/ plant)	0.54	0.71	**	0.75	0.91	*
Biological yield (g/plant)	1.06	1.37	**	1.38	1.69	**

Results

Irrigation with magnetic water of Lentil plantations had resulted in a significant increase in plant height, wet and dry mass. Average values for 2 seasons increased by 21.75, 18.18 and 15.05% on the above listed indicators.

Magnetic water treatment noticeably stimulated pigments of chlorophyll a, chlorophyll b, chlorophyll a and b, carotenoids and total amount of phenol and indole. Percent increase the above parameters were: 13.58, 44.67, 21.4, 2.7, 21.4, 20 and 148.19%.

Increase in overall crop parameters: number of branches, capsules and seeds per plant, weight of capsules, seeds, straw and biological yield, 100-seeds weight. Average values for 2 seasonal totaled to 25.48, 29.08, 17.03, 17.88, 24.98, 26.69, 25.82 and 6.24% on listed above parameters.

India. Magnetic treatment of seeds.

ITC Demonstration & Education Farm, Annasagar Village, Mulugu Mandal, Medak Dt, Andhrapradesh





Increase in germination of capsicum seeds about 8 %

Results of magnetic treatment on chili pepper plantations.

ITC Demonstration & Education farm, Annasagar Village
Mulugu Mandal, Medak Dt
Andhrapradesh

This experiment involved magnetic treatment of Chili Pepper. Magnetic devices were installed on 10 rows of irrigation pipes, followed by 3 rows of crop area as a buffer zone and then a control of 10 rows using regular irrigation.
Date of seeding 03.03.10. On 05.06.10 an examination took place to compare yield grown using regular water and yield grown using magnetic treatment:

Preliminary Report

Crop:	Capsicum Heera (Seminis seeds)
Magnetic treated water:	10 rows
Normal water:	10 rows
Buffer:	3 rows
Date of Planting:	03.03.10
Date of Observation:	05.06.10

Water treatment	Average		Yield, kg
	height, cm	fruits per plant, No	
Normal	47.2	5.8	3.50
Magnetic	46.8	8.2	6.32

Increase in yield of capsicum about 80%





Pakistan. Effect of magnetic treatment on seed germination.
Laboratory of Agronomy Department
University of Agriculture
Faisalabad
August 2010

No	Crop	Seeds Germination (%)	
		Control	Magnetic
1	Mungbean	70	80
2	Rice	82	88
3	Maize	14	18
4	Cotton	22	20

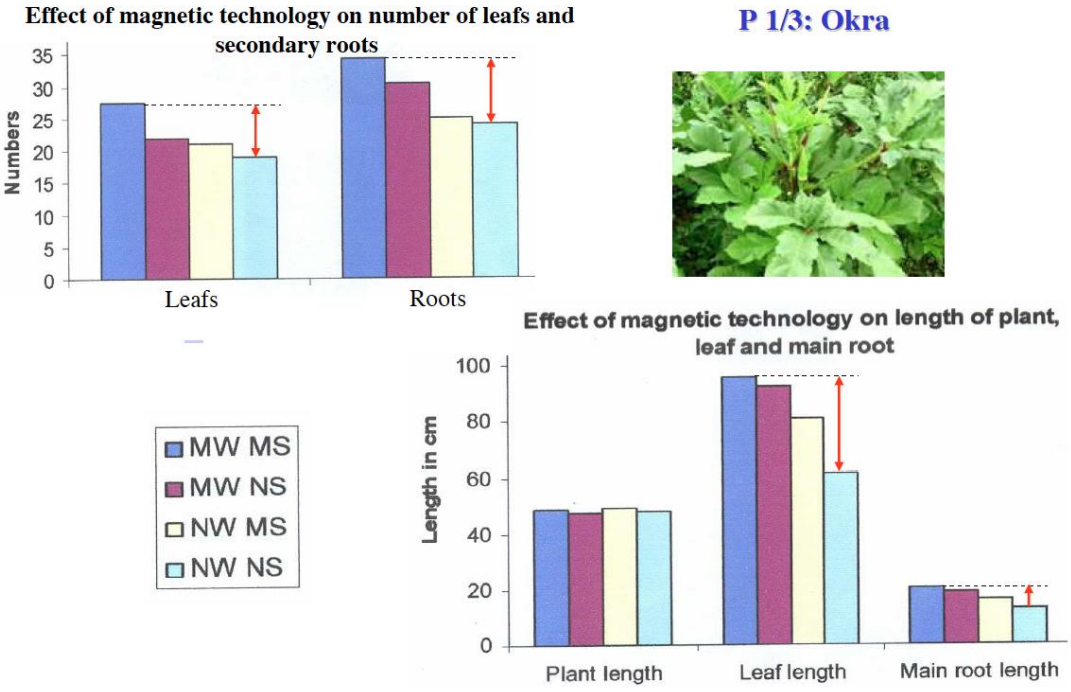
Department of Irrigation and Drainage
University of Agriculture
Faisalabad
January 2011

	T1= MW+MS	T2= NW+MS	T3= MW+NS	T4= NW+NS
Block1	82.86	83.70	74.43	73.59
Block 2	83.42	81.74	74.43	72.75
Block 3	70.78	83.98	77.24	74.71
Block 4	72.75	87.64	78.93	67.69
Average, %	77.45	84.27	76.26	72.18

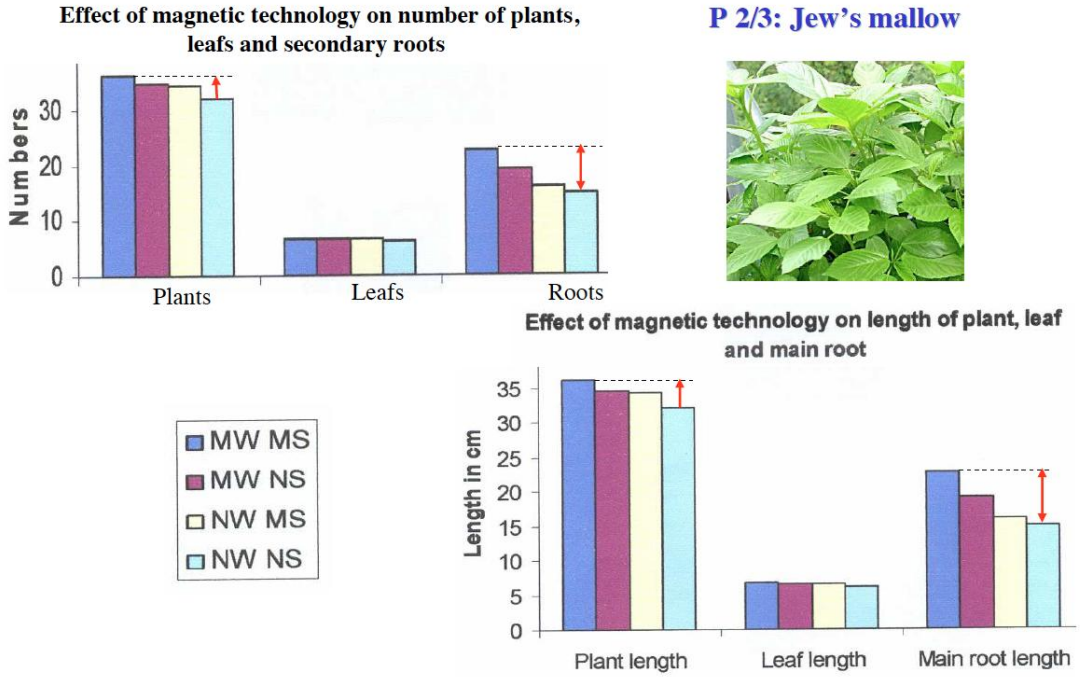
Sudan. Physical properties of regular and magnetically treated waters.

	Surface tension, n/m 10^{-3}	Capillarity, cm	Viscosity dynamic, kg/(m*s)*10^{-4}	Dielectric susceptibility (permittivity)	Specific heat, J/(kg*K)*10^{3}
Normal	6.792	2.54	7.322	80.90	4.132
Magnetized	6.911	2.70	7.283	82.40	4.120
+ 1.0 hour	6.893	2.68	7.291	82.13	4.128
+ 2.5 hour	6.871	2.67	7.300	81.98	4.125
+ 4.0 hour	6.860	2.66	7.306	81.80	4.127
+ 5.0 hour	6.843	2.64	7.312	81.50	4.129
+ 7.0 hour	6.825	2.61	7.317	81.20	4.130
+ 8.0 hour	6.812	2.59	7.319	81.00	4.130

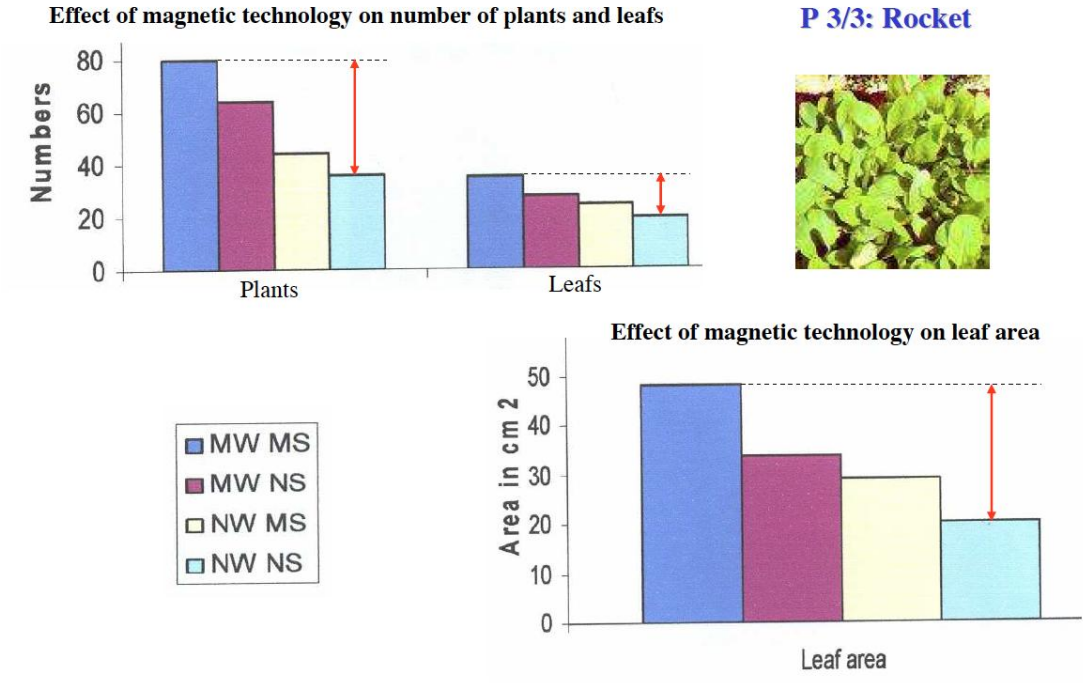
Sudan. Magnetic treatment in conjunction with drip feed method. Results of okra yield.



Sudan. Magnetic treatment in conjunction with drip feed irrigation method of Mallow plant.



Sudan. Magnetic treatment in conjunction with drip feed irrigation method of Rocket plant.



Sudan. Soil sample analysis after 2-month irrigation using regular and magnetic waters.

Depths	SP	pH	Ece	Ca+Mg	Na	SAR	CaCO3	BD	HC
Normal water									
0-10	56.08	8.05	0.45	2.46	2.32	2.4	2.29	1.39	0
10-20	55.88	8.26	0.33	1.6	2.28	1.48	4.94	1.19	0.19
20-30	59.01	8.19	1.96	3	5.1	5.48	4.18	1.74	0
Magnetized water									
0-10	60.38	7.62	1.63	2.8	1.56	1.98	2.78	1.56	0.05
10-20	71.78	7.71	1.03	4	2.31	2.01	3.44	1.65	0.13
20-30	60.64	8.15	0.94	4.5	1.71	13.91	3.04	1.49	0.10

Conclusion

Harmful emissions on lines of irrigation pipes with regular water were on average 90%. Whereas emissions above pipes with magnetic water were 50%. Therefore magnetic treatment of irrigation water significantly reduces pollution and accumulation of salts in both water and pipes.

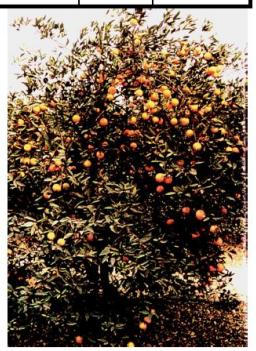
Magnetic treatment of irrigation water and seeds improves almost all indicators of plant growth, particularly overall density, number of leaves and their size, number and development of root system.

It is also important to note that the magnetic treatment of irrigation water and seeds, can considerably reduce seed wastage and water requirements.

Egypt. Effect of magnetic treatment on nutrients of Oranges using brackish water for irrigation.

Tree cover	Extractable nutrients (ppm) from root zone							
	N		P		K		Fe	
	NW	MTW	NW	MTW	NW	MTW	NW	MTW
Olives	515	770	80	180	46	98	32	114
Citrus	-	-	73	145	94	160	8	30





Egypt. Analysis of magnetically treated cultivated soil on concentration of nutrients in apple and olive plantations.

Water Treatment	Soil Death cm	P		K		Fe	
APPLES							
Magnetized water	0-20	189	180	157	205	80	44
	20-50	115	130	164	126	51	37
Non-magnetized water	0-20	158	96	71	65	19	30
	20-50	35	44	50	18	13	12
OLIVE							
Magnetized water	0-20	168	261	105	261	85	41
	20-50	121	300	180	305	47	39
Non-magnetized water	0-20	216	182	71	147	21	28
	20-50	67	98	18	16	10	10

Australia:
Report on the influence of magnetic technologies on irrigation water and reduction in its volume usage when growing vegetables.

(University of Western Sydney, Australia)

Studies were conducted on different irrigation systems of crops of Peas and Celery and were aimed to identify the effectiveness of use of magnetic technologies.

The experiment used bottled, brackish and recycled tap waters. Part of it was treated with magnetic devices, and the other used for irrigation in its natural form. The study took place at the Sydney West Institute (Richmond campus) from April 2007 to December 2008. All experiments were performed in the laboratory.

Overall results showed a positive dynamics with the use of magnetic technology. Magnetic treatment of recycled and brackish water (3000 ppm) increased celery yield (12%) and pea yield (23%). It also reduced consumption of add on by 12% and 24%.

Yield of peas in laboratory conditions increased by 7.8% (bottled magnetic water), 5.9% (recycled tap magnetic water) and 6.0% (brackish magnetic water 1000 ppm). Reduction in the need of irrigation water was 12% (bottled magnetic water), 7.5% (recycled tap magnetic water) and 13% (brackish water magnetic 1000 ppm).

Australia. Effect of magnetic treatment of irrigation water on yield parameters of celery, of water and reduction of its volume requirements.

	Water			
	potable	STP	1500 ppm	3000 ppm
Mean yield fresh weight	0.0	**12.4**	9.6	**22.9**
Mean yield dry weight	-2.0	**12.0**	4.3	**26.9**
Mean root dry weight	-3.2	2.9	-0.4	**14.7**
Water use	-4.3	-0.6	-1.5	-0.8
Water productivity	4.4	**11.7**	**11.1**	**23.7**

There was significant increase in water productivity based on fresh weight by applying magnetically treated 3000 ppm saline water, 1500 ppm saline water and recycled water when compared with the controls. Similar trends were also observed for the water productivity based on dry weight, but the increase for 1500 ppm saline water was not significant.

Australia. Effect of magnetic treatment of irrigation water yield parameters of peas, of water and reduction of its volume requirements.

	Water			
	potable	STP	500 ppm	1000 ppm
Mean yield fresh weight	**7.9**	**6.0**	1.1	**6.1**
Mean yield dry weight	**10.8**	**6.9**	1.7	**8.2**
Mean shoot dry weight	0.4	0.5	-0.4	2.6
Mean root dry weight	-3.7	-3.1	4.2	8.7
Water use	-3.8	-1.4	-0.3	-5.8
Water productivity	**12.1**	**7.5**	-0.1	**12.6**

For water productivity based on fresh weight basis, the effects of the magnetic treatment were significant for potable water, recycled water and 1000 ppm saline water. Similar trends were also observed for water productivity based on dry weight basis, but the effect of magnetic treatment was non-significant for recycled water.

Australia. Effect of magnetic treatment of irrigation water yield parameters of celery, of water and reduction of its volume requirements.

	Water			
	potable	STP	1500 ppm	3000 ppm
Mean yield fresh weight	1.25	8.1	**-1.9**	5.7
Mean yield dry weight	0.0	9.7	-1.9	4.8
Water use	-4.8	0.1	-2.2	-2.1
Water productivity	5.2	6.7	0.0	4.2

Australia. Change in parameters of irrigation system of vineyard using magnetic systems.

Farm 1986
Lake Wyangan, NSW2680, Australia
Ph. 02 69634822
Fax 02 69634829
Violi-estates@bigpond.com

	UNMAGNETIZED	MAGNETIZED
VINEYARD MAIN LINE RUNNING PRESSURES (kPa)	420	480
VINEYARD MAIN LINE VOLUMES (m^3/hr)	520	570
DRAW OF CURRENT ON 2 X100HP PUMPS (Hz)	50	45





BioElectroMagnetics 32:58 - 65 (2011)

Magnetic treatment of irrigation water used for growing of peas.

Improvements in nutritional value indicators and overall growth increase.

Harsharn S. Grewal
Basant L. Maheshwari
School of Natural Sciences,
University of Western Sydney, Penrith South DC,
NSW, Australia

Seedling Emergence and Emergence Rate Index (ERI)

Treatments	Emergence, %		ERI, %	
	Snow Pea	Chickpea	Snow Pea	Chickpea
Control	62.5	68.8	0.375	0.455
MTW	75.0 (20.0)	93.8 (36.4)	0.532 (41.6)	0.688 (51.0)
MTS	68.8 (10.1)	81.3 (18.2)	0.500 (33.2)	0.625 (37.3)
MTWS	93.8 (50.1)	87.5 (27.3)	0.688 (83.3)	0.652 (43.2)
	S	*NS*	*S*	*S*

Effect of magnetic treatment of irrigation water on average germination rate and dry mass of seedling roots.

Treatments	Shoot weight, mg/plant		Root weight, mg/plant	
	Snow Pea	Chickpea	Snow Pea	Chickpea
Control	62.3	46.3	38.62	89.4
MTW	77.6 (24.7)	55.5 (19.8)	43.11 (11.6)	90.8 (1.6)
MTS	69.1 (11.0)	48.2 (4.1)	38.95 (0.8)	89.8 (0.5)
MTWS	67.1 (7.8)	49.3 (6.5)	37.10 (-3.9)	88.7 (-0.7)
	S	*S*	*S*	*NS*

Effect of magnetic treatment of irrigation water and seeds on increase of nutritional values of peas 20 days after seeding.

Nutrients	Magnetic Treatment of		
	water	seeds	water and seeds
N	22.56	11.31	8.37
P	7.25	3.97	1.73
K	14.43	8.76	3.34
Ca	33.33	27.78	16.67
Mg	14.45	9.83	5.20
S	13.11	8.99	5.62
Na	36.99	15.07	6.85
Zn	17.34	19.06	16.49
Cu	20.20	12.12	5.05
Fe	14.65	14.37	6.25
Mn	36.98	25.26	20.05
B	19.17	17.50	5.00

Effect of magnetic treatment of irrigation water and seeds on increase of nutritional values of chickpeas 20 days after seeding.

Nutrients	Magnetic Treatment of		
	water	seeds	water and seeds
N	16.53	4.46	5.45
P	11.45	6.33	6.63
K	16.10	4.58	6.02
Ca	13.76	0.34	1.01
Mg	18.42	14.04	12.28
S	11.11	-1.11	-2.22
Na	3.78	-2.76	-4.51
Zn	14.49	7.39	8.52
Cu	11.47	-1.01	0.79
Fe	17.65	3.21	3.21
Mn	12.24	4.08	2.04
B	12.26	5.66	2.83

Conclusion

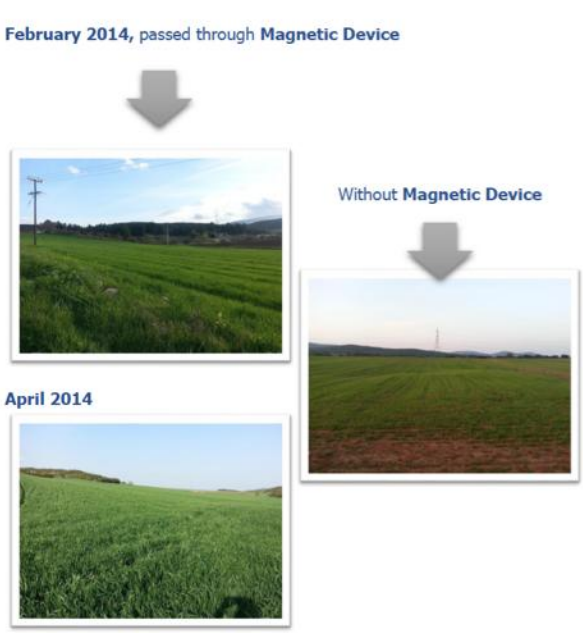
Treatment of irrigation water and seeds with magnetic fields have significantly increased ERI of seedlings (33- 38%) and dry weight of shoots (4- 25%) in peas and in chickpeas.

Also nutritional content of N, K, Ca, Mg, S, Zn, Iron and Mn have increased in peas by 13- 37% and in chickpeas by 11- 18%.

Report from Greece

Wheat
Dervenohriya, Teba, Greece 2014
Dimitris Stamanis, big farmer

The experiment took place on a plot of 2,20 acres of wheat. As a result a plot with magnetic devices required 30% less seeding material.













May 2014









July 2014, Result












Normal Water
Magnetic Water









Yield increased from 110kg to 140kg per acre.

Oranges and pomegranates
August 2014
Argolic, Nafplion Peloponez
Sotris Grigoriadis, big farmer



























January 2014

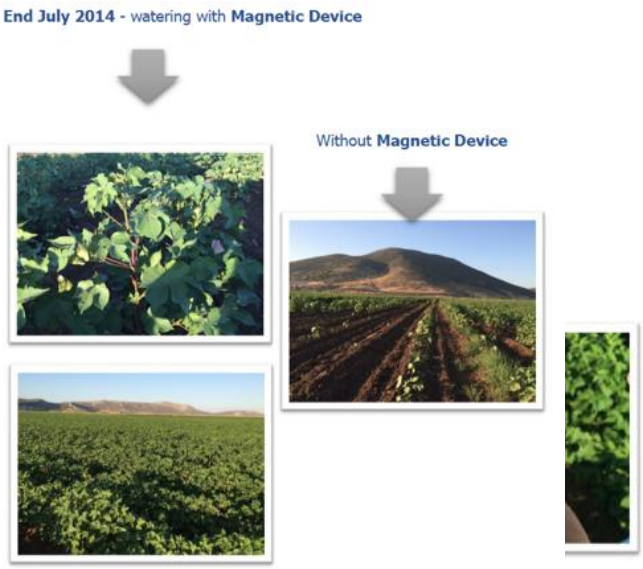
Dried lemon trees revive after irrigation with magnetic water. (From the author)
Many of our clients have observed such life-inducing qualities of magnetic water.

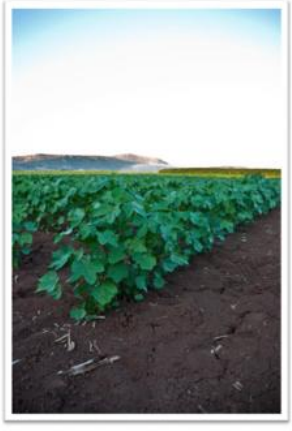


Cotton.
Vagia, Teba, Greece, 2014
Vassilis Sidiropulus, big farmer

Cotton which was irrigated using magnetic water showed a huge difference in quantity and quality of the crop.
Land: 400 acres.
Seeding date: 17-22 June and 27 October 2014



















650 days of magnetic treatment
Hazelnuts watered using magnetic water had on average 35 kernels per plant, compared to just 5-10 of hazelnut trees using regular water for irrigation.

Also there was a difference in color of the leaves, i.e. dark green in magnetically treated and yellowish in regular. Nut kernels from magnetic plants had clear white color and were worm free.

















Without With (Magnetic Device)



















Potatoes and Onions

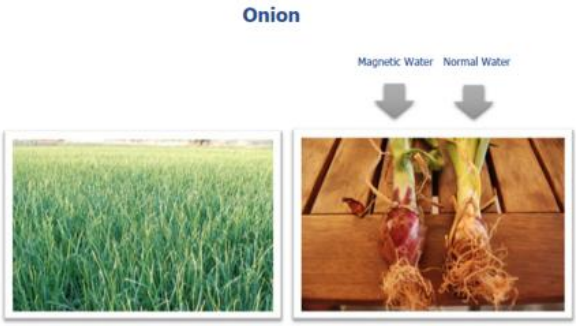
June 2013
Elateia, district Fthiotida, Greece

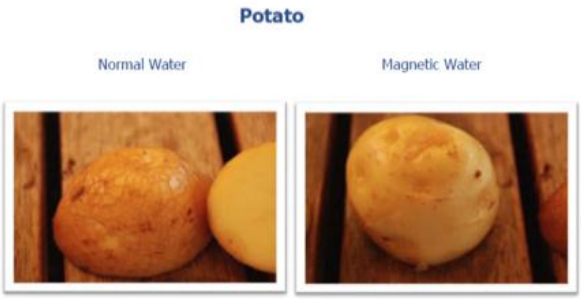
Panagiotis Karauzoas, farmer, a large producer of vegetables

A clear example of how magnetic treatment enhances production of potatoes and onions.

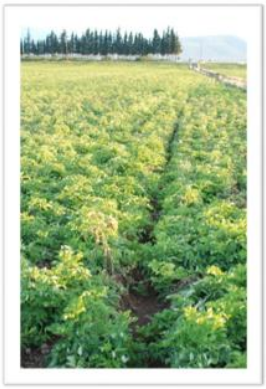
Potatoes grown using magnetic water cook faster, contain more nutrients and have a richer flavor than regular potatoes. Potato yield on magnetic plot of land is 47% higher than on control plot. Onion yield increased by 18%. The difference is obvious.

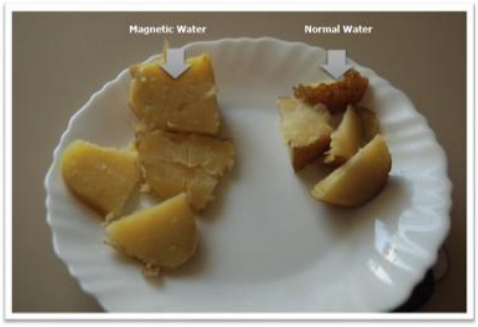
Onion





Potato





Desalination of Water and Soil

Salinity levels are one of the major challenges of the agricultural sector. Using magnetic systems addresses these issues successfully, as confirmed by numerous experimental results worldwide in totally different environments.

Soviet scientists have conducted countless tests and concluded that magnetized water is absorbed into the soil at 0.1 g /cm faster than non-magnetized. Rate of filtration doubles and every 100 g of soil, irrigated by magnetic water, loses more than 10 g of salt.

When a 5% aqueous solution of industrial iron sulphate underwent magnetic treatment, it produced meliorant, which extracted 20 g (per 100 g) more salt from soil than ordinary water. Subsequently, these findings were confirmed repeatedly in the field and in laboratory conditions.

Tests were carried out on soil with the following parameters:

CO_3^{2-}	0.019	Ca^{2+}	0.082
HCO_3^-	0.066	Mg^{2+}	0.006
Cl^-	0.572	$Na^+ + K^+$	1.072
SO_4^{2-}	1.663		

Dry residue 3.46 mg /l. Magnetic treatment of water with parameters (mg/l): HCO3 - 1.94; Cl - 0.79; Ca2 + - 1.16l Mg2 + - 0.76. Dry residue was 372 mg/l. Results indicated that at optimal settings of a magnetic system, treated water can be 5 times more effective in desalination than ordinary water.

A group of experts held a comparative experiment to test the effectiveness of the use of hydrochloric acid and magnetic water soil desalination provided an interrupted water supply to soil (1973). The experiment was carried out in laboratory and field conditions. Whole sections of soil were used in both cases. In the field experiment that was conducted on a plot of land from 25 to 100 m2, cross section of 0.8 m2 and depth of 2 m. A magnetic system was used to treat water with a flow rate of 1.5-2 m / sec.

Mineralization of the water ranged from 0.7 to 7.5 g/l.
Soil for irrigation contained chloride and sulfate salts. The highest point in the solubility of salts of this soil did not exceed 2.5%. A one meter thick layer contained up to 225 ton of salt per hectare. Whereas a layer of a 2 meter in thickness -340 tons.

Also soil had a lot of gypsum, up to 5.5% and 15- 20% at a depth of 20 cm and 120-140 cm, respectively. Sample soil contained large amounts of calcium carbonate. Total mass of absorbed substances (Ca, Mg, N, and K) equaled to 19-22 mg per 100 g of soil. Absorption of sodium exceeded the mentioned above amount by 20-25%.

In regards to chemical reagents, soil was treated with 0.5% and 1% hydrochloric acid solution taken in the amount equal to the shortage of moisture. Intake of hydrochloric acid was 8.6, 17.2, 25 and 34.4 tons per hectare.

Laboratory experiments showed that magnetic treatment of water accelerates the initial filtration rate by 20-30%. This pattern can improve the aggregate composition of the upper layers, which have a reduction of fine fractions (less than 0.005 mm) due to coagulation. A procedure of flushing soil with magnetic water causes an increase in mobile phosphate forms and increases volume of nitrification in the upper layers of the soil (see Table 3).

Table 3. Changes in the composition of nutrients of plants after treatment of soil with magnetized water (mg per 100 g of soil)

#	Indicators		
		0-20	20-40
1	Soil		
	N	0.50	0.27
	P_2O_5	6.60	4.00
	K_2O	75.30	57.80
2	After ushing with normal water		
	N	-	0.10
	P_2O_5	7.00	3.00
	K_2O	55.40	45.20
3	After ushing with magnetic water		
	N	3.70	0.60
	P_2O_5	8.20	4.50
	K_2O	53.60	41.60

By watering a two meter monolithic layer of soil with high salinity, it was found that magnetic water flushes out salts by 18-32% more effectively than a solution of hydrochloric acid.

Results were obtained in field trials:

It is also important to note that stubborn sodium sulfate would flush out more effectively in the early stages - more than 70%. Also magnetic treatment supports mineralization of water by up to 7-14 g/l.

#	Depth, m	Salt reserves in the soil layer						Salts removed after wash-out			
		Before flushing		After flushing by usual water		After flushing by mag. water		usual water		magnetized water	
		%	t/hec	%	t/hec	%	t/hec	%	t/hec	%	t/hec
1	0-0.3	2.9	126	2.3	100	1.6	70	26	100	56	216
2	0.3-1.0	2.4	242	1.9	192	1.4	142	50	100	100	200
3	1.0-1.5	1.7	123	1.4	102	1.3	94	21	100	29	138
	Total depth										
4	0-1.0		368		292		212	76	100	156	205
5	0-1.5		451		394		306	97	100	185	192

Extensive field tests were conducted by Agro-physical Institute with collaboration of the Institute of Design of Water Systems and "Tajikistan-stroi". Tests were conducted in Zafarobadski area (Golodnaya Step, Tajikistan, USSR) in an area of 10 hectares of soil with most salinity. Tests took place after successful laboratory experiments. Square test plots were separated by drainage tracks. Soil samples were taken from each hectare at a depth of 0.3m, 1m and 1.5m before and after irrigation. Number of soil flushes was determined by a standard that included 12,000 m3 / ha (three stages of 4,000 m3/ha) on soil with 2.5% salt content. Total time period of soil flushing was 1.5 months.

Magnetic water is able to flush out salts 2 times more effectively than ordinary water (see Table 3). Found striking is the fact that ordinary water hardly flushes out any salts. This is particularly indicated by a content of HCO3 (see Table 5). The oxygen content of magnetic water is 10% higher than in ordinary water.

#	Anions	Water	
		Normal	Magnetized
1	Cl	30	50-80
2	SO_4^{2-}	15	30
3	HCO_3	0	30

The problem of soil desalination is related to another important issue - the use of saline water for irrigation. Currently brackish water is not suitable for irrigation for 2 reasons:

1. Plants accumulate salts, which in turn disrupts its metabolism.
2. Harsh salts accumulate in soil, making it impermeable to nutrients.

However, years of experience have shown that magnetic treatment can make salty water fit for agricultural irrigation. A set of experiments mainly in Azov and Black Seas gave positive results. Institute of Water and Irrigation in Azerbaijan held a series of experiments using magnetic treatment of salt water from Caspian Sea (salinity 14g/l). This resulted in multiple harvests of sorghum and corn by 45% and 30% more yield than regular irrigation.
A method of using brackish water and soil desalination in agriculture.

Magnetic treatment of brackish water with devices by 'Magnetic Technologies' has the following effect:

- Prevents formation of encrustations in the pores of soil and plant capillaries.
- Breaks down and prevents formation of new salt crystals in irrigated soil by magnetic water.
- Increases nutrients accessibility to plants uptake.

Brackish water has a high salt content usually referred to as 1000-7000ppm as but less than that of seawater. It often obtained by mixing fresh and sea water, for example in river deltas and from ground water. Also brackish water can form as a result of human activity, i.e. creation of dams, shrimp farms, irrigation lakes etc. where small amounts of salt content remains and builds up after evaporation or irrigation extraction.

Brackish water is harmful for growing all terrestrial plants. Technically, brackish water contains from 0.5 to 30 grams of salt per liter. Most often expressed in units of 0.5 to 30 g per thousand (ppt or %). Thus water salinity is a very inaccurate parameter.

Degree of water salinity

Fresh water: <100 ppm
Urban water supply: up to 500 ppm
Irrigation water: up to 2000 ppm
Brackish water, soft: 1,000 - 7,000 ppm
Brackish water, moderate: 7,000 - 15,000 ppm
Brackish water, hard: 15,000 - 35,000 ppm
Seawater: 30,000 - 50,000 ppm (typically 35,000 ppm)
Dead Sea: 330,000 ppm

World water reserves

It was established that 97.5% of the world's water reserve is salt water and remaining 2.5% is fresh. About 70% of freshwater is locked in the glaciers of Antarctica and Greenland, and less than 1% is available for human consumption (0.007% of the world's water): lakes, rivers and shallow underground sources. This 0.007% of world's reserves is replenished by rain and snowfall.

Everyday water is used for different purposes. Agriculture consumes on average over 60% of fresh water supplies; in Asia - 86%, North and Central America - 49%, in Europe -38%. Rice production requires large quantities of water, about 5,000 liters of water to grow 1 kg of rice (7,650 m3/ha.). However wheat still requires 4000 m3/ha and it takes 4,000 liters of water to produce 1 liter of biomass (ethanol).
According to rough estimates, about 10% of fresh water is used by households and only a small part of it is used for drinking.
It is also important to note that about 25% of fresh water is lost before it reaches end user due to leaks. Within agriculture approximately 40% fails to reach the plant

for numerous reasons. Including mismanagement of irrigation systems in conjunction with leaks and inefficient storage facilities.

The use of Magnetic technologies

Magnetic treatment enables to use brackish water with a salt content of up to 6500 ppm for agriculture. It also enables the recycling of agricultural water for domestic purposes as grey water for toilets and gardens

Application of magnetic treatment for desalination of soil and its decontamination

Process of soil desalination

This issue can be efficiently resolved by magnetic treatment, which results in breaking down and dissolution of salt crystals contained both in water and soil.
This effect is supported by many experiments and practical applications of devices by 'Magnetic Technologies' across the globe.

Over 20 years of practical implementation of magnetic technologies in agriculture has led to the development of various types of devices. These vary in their specifications depending on the parameters of irrigation water, flow capacity and soil composition. Magnetized water is 2 times more effective than ordinary water when it comes to flushing out harmful salts from soil and retains its effectiveness in cases of mineralization of water by up to 7000-8000 ppm. It can even cope with such compounds as sodium sulfate.

Irrigation of plants using brackish water has the following implications:

1. Salt crystals accumulate in and upon the soil, making it unsuitable for agriculture, being un-penetrable by irrigation and rain water

2. Salt crystals accumulate in and upon the plant slowing down its metabolism, suffocating it from water absorption.

Magnetic water treatment in field trials using devices of 'Magnetic Technologies' made it possible to use Caspian Sea water (14,000 ppm) for irrigation.

Effect of magnetic treatment on deep underground sources of brackish water.

Experiments show that magnetic water can gradually desalinate deep sources of brackish water, making it suitable for irrigation in the future.

Conclusion

Magnetically treated brackish water has many advantages over non-magnetically treated water because of its ability to break down crystals of salt and other
adverse materials found in agriculture environments, thereby cleaning the soil and allowing plants to effectively absorb nutrients, while not accumulating harmful substances.

The most successful results from practice were:

- 45% increase in total crop of sorghum.
- 30% increase in total crop of maize compared to ordinary irrigation water.

It has been proven that magnetic water absorbs into soil faster, more effectively and has ability to cleanse it from various harmful compounds.

The use of magnetic devices:

- Has no side effects side effects and is harmless to plants.
- Decontaminates soil and water used for irrigation.
- Warranty period of each device is at least 10 to 15 years, during which a lot of saline cultivated areas can be restored.

Magnetic Treatment of Seeds

Seeds are the main foundation of a future plant. Its viability is determined by its immunity. Seed material can be of different qualities, for example immature grain has the ability to germinate as soon as warm wind or warm rain falls on moist soil. At the same time it will take 6-9 days for seed planted with the crop in the same soil to germinate under adverse conditions. This is nature's way to show its adaptability to survive. During harvest of crop, its seeds have different properties and therefore not all will germinate in the future. Therefore to ensure the desired number germinates, marginally more seeds are planted. Thus an optimal amount per hectare is selected. For example, wheat crop requires 6,000 kg of 1.5 ml per hectare.

It is considered a norm to sow 7 ml of germinated seeds (700 pc /m2), which is more than 4.7 times. In order to be safe, usually 10-12 ml or 8 times more the amount is seeded. So it needs 80 million tons of sowing material to seed a field of 80 million hectares in Russian Federation.

Magnetic treatment of weak seeds can save about 30% of total volume, given the same example of 8 million tons. Also treatment of healthy seeds, will save 30%, which is around 5 million tons. As a result, a total saving of such costly material as seeds will be 13 million tons.
Properties of a seed is determined by a process where a proton pump, located in the cell membrane, transforms it from a dormant state by means of phusiocoxin and activates auxin at level R1, cytocycin at R2 and phusicocin at R3. This accelerates exchange of oxygen, seed germination and increases cell volume using inflow of energy from the membrane and with the help of electrical potential which is transmitted through a cell membrane in a direction of low-pressure

Magnetic treatment restores the metabolism of seeds and provides protection from harmful effects of modern technologies used in agriculture. Magnetically treated plants acquire enormous genetic potential. This also applies to seeds which are able to maintain their genetic properties under extreme conditions. All seeds of cereals, fruit, and apple trees (Belsky, 1968) and cypresses (Jenn, 1975) have a shell, which slows down diffusion of oxygen and water absorption. In turn, the inhibitors will prevent seeds from germinating. This can be solved by using sodium hydroxide or phusicocin. A specialized magnetic system can serve as a complete replacement of costly process mentioned above. Naturally, there are hormones facilitating awakening of seeds.

For example, hormones used in apples contain auxin and gibberellin. These hormones reduce germination period of seeds by up to 30 days, whereas the same seeds after magnetic treatment can sprout on day 9 (see Figure 2).

The breakdown of the seed coat is stimulated by red light and magnetic field. Root growth of the seed can be accelerated by using ethylene treatment inside a special gas chamber. Seeds of cherry, apples and pears can be activated and its germination rate can be accelerated by piercing its coating or completely removing it. In comparison to chemical reagents, magnetic systems are easier to use and more affordable.

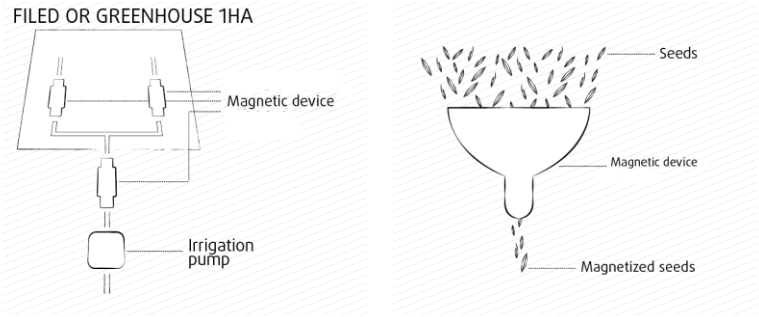
The following process occurs in the seeds (see Figure 3)- magnetic field reduces inhibitors' effect by increasing pH of a cell sap. Magnetic field x0 outside influence on polex 'within the cell membrane through energy x and receives
Back signal from x1 through x-membrane and x0. This leads to intensification, amortization or absorption depending on parameters of the magnetic field used. A specific magnetic field is selected for each culture depending on the issue at hand. Activation of any of the qualities of a future plant depends on the magnetic gradient and selection of a magnetic material, which enhance transcription RNA. This results in the formation of proteins, stimulates root growth and helps germination of weak seeds, which would not naturally germinate.

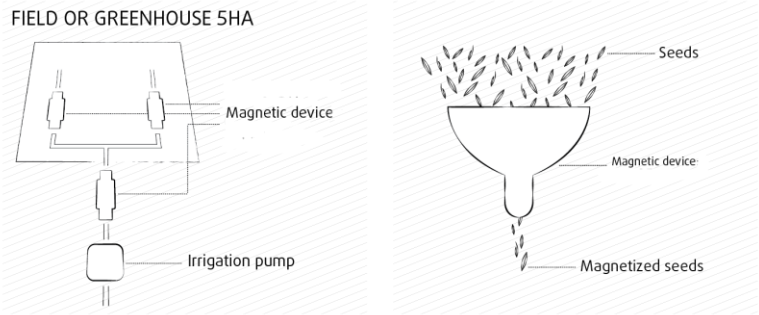
Crop Areas

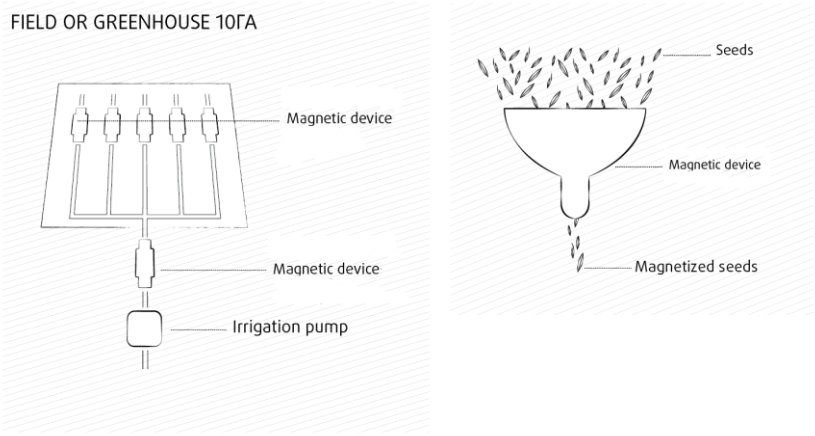
It is evident that different crop areas require different technical conditions for irrigation. In some cases it is main water pipes, in others it is wells. Sometimes it is a set of pumping equipment with water intake from natural or artificial reservoirs. For each of these options we will find the optimal solution for installation of our equipment.

Below are a few hypothetical examples of installing magnetic systems in different sized crop areas with centralized water supply.

Some examples of potential installation of magnetic devices:







Magnetic devices is being selected by formula: 10m3/hour on 1 hectar.

Appendix A

Magnetic Devices

Specialized magnetic devices can be divided into 2 categories: systems for water magnetization and systems for seed/animal feed magnetization.

Either metal or plastic is used in manufacturing of most systems.

The main difference between different systems/devices is its water capacity/hr and its resilience to harsh environments.

1	ADS-200	 Output 8-12 m3/hr, PVC body. Used without preliminary filtration, enables use of water with 5-8 grams of salt/liter.	
2	A-200-U		
3	AGI-200	 Output 14-20 m3/hr, metallic body. Used without preliminary filtration of water with salt content: 5-8 g of salt/liter.	

4	A-300-DU	 Output 20-40 m3/hr, PVC body. Used without preliminay filtration of water with high salt content: 5-8 g of salt/liter.	
5	AGI-300-D	 Output 20-40 m3/hr, galvenized metallic body. The magnetic device contains elements for electrons generation and aeration. Used without preliminary filtration of water with a high salt content: 5-8 g of salt/liter.	
6	A-400	 Output 35-55 m3/hr, PVC body. Used wothout preliminary filtration of water with a high salt content: 5-8 g of salt/liter.	
7	AGI-400-D	 Output 35-55 m3/hr, PVC body. The magnetic device contains elements for electrons generation and aeration. Used wothout preliminary filtration of water with a high salt content: 5-8 g of salt/liter.	
8	AB 600	 Output 55-90 m3/hr, galvenized body. The magnetic device contains elements for electrons generation and aeration. Used wothout preliminary filtration of water with a high salt content: 5-8 g of salt/liter.	

9	AD 600	 Output 80-160 m3/hr, galvenized body. The magnetic device contains elements for electrons generation and aeration. Used wothout preliminary filtration of water with a high salt content: 5-8 g of salt/liter.	
10	A 600	 Output 70-120 m3/hr, galvenized body. The magnetic device contains elements for electrons generation and aeration. Used wothout preliminary filtration of water with a high salt content: 5-8 g of salt/liter.	
11	A 600 d	 	
12	AGI-800S	 Output 90-160 m3/hr, galvenized body. The magnetic device contains elements for electrons generation and aeration. Used wothout preliminary filtration of water with a high salt content: 5-8 g of salt/liter.	
13	AGI-800	 Output 130-220 m3/hr, galvenized body. The magnetic device contains elements for electrons generation and aeration. Used wothout preliminary filtration of water with a high salt content: 5-8 g of salt/liter.	

14	AGI 1000D	 Output 200-350 m3/hr, galvenized body. The magnetic device contains elements for electrons generation and aeration. Used wothout preliminary filtration of water with a high salt content: 5-8 g of salt/liter.	
15	AMS-1200	 Output 300-500 m3/hr, metallic body. The magnetic device contains elements for electrons generation and aeration. Used wothout preliminary filtration of water with a high salt content: 5-8 g of salt/liter.	
16	AGI-1200D	 Output 300-500 m3/hr, galvenized body. The magnetic device contains elements for electrons generation and aeration. Used wothout preliminary filtration of water with a high salt content: 5-8 g of salt/liter.	
17	AMS-1200D	 Output 300-500 m3/hr, metallic body. The magnetic device contains elements for electrons generation and aeration. Used wothout preliminary filtration of water with a high salt content: 5-8 g of salt/liter.	

18	AGI-1400D	 Output 400-650 m3/hr, galvenized body. The magnetic device contains elements for electrons generation and aeration. Used wothout preliminary filtration of water with a high salt content: 5-8 g of salt/liter.	
19	AGI-1600D	 Output 520-780 m3/hr, galvenized body. The magnetic device contains elements for electrons generation and aeration. Used wothout preliminary filtration of water with a high salt content: 5-8 g of salt/liter.	
20	AGI-1800D	 Output 520-780 m3/hr, galvenized body. The magnetic device contains elements for electrons generation and aeration. Used wothout preliminary filtration of water with a high salt content: 5-8 g of salt/liter.	
21	A 100 F	MAGNETIC DEVICE FOR SEEDS 	

22	A 600 F	MAGNETICF DEVICE FOR SEEDS 	
23	A 1000 F	MAGNETIC DEVICE FOR SEEDS 	

Hydroponics. Green Houses



According to the Food and Agriculture Organization of the United Nations (UN FAO) more than 800 million people do not have enough to eat. Hydroponic technology offers the potential of reducing hunger. This technology has been explored since 1984 in Colombia and introduced in 13 countries with projects supported by UN FAO, UN Development Program (UNDP) and others. The technology reduces land requirements for crops by 75% or more, and water use by 95%.

Few people know that Hydroponics first originated in the Middle East. Thousands of years ago the inhabitants of this region were growing plants without land in the Hanging Gardens of Babylon.

Bahrain is a good example of how an entire nation can benefit using hydroponics. This state is a small island near the western shores of Arabian Gulf. The territory consists of desert plains and has shortage of fresh water. This small island is surrounded by sea water. Because of this it invests large funds in hydroponics. Given constant increase in food prices, government of Bahrain trains local people in hydroponic crop production and encourages them to use hydroponic systems.

As the global population continues to grow, the value of crop will also rise. Expect to see many more governments and companies investing in hydroponics systems in near future as the costs of water, fertilizers and labor continue to rise.

Disaster Recovery and Drought Resilience

Enhancement of hydroponics using Magnetic Technologies

There are 7 types of hydroponic growing systems:

[Aeroponics, Drip, Ebb and Flow, N.F.T, Water Culture and Wick.]

1. Aeroponic System: One of the most high tech growing systems
2. Drip System: The most widely used type of hydroponic systems
3. Ebb and Flow System: The system can be modified in many ways
4. N.F.T.: Nutrient Film Technique System - most commonly thought of
5. Water Culture System: A very simple to use hydroponic system
6. Wick System: The simplest of all hydroponic systems
7. Aquaponics: Combines water use for plants and fish production

Water molecules, due to activity 'interference', lose their polarity charge and then naturally cluster by creating hydrogen bonds, retaining and suspending pollution particles, restricting the plants and animals from efficiently absorbing the water through their cells. Magnetizing water breaks the hydrogen bond between molecules reverts the molecule distribution evenly, recharging the molecules, allowing water to be used more efficiently, lessening required intakes, maximizing nutrient absorption.

Effectiveness, aims and advantages of using magnetic technologies in hydroponics

- Iron and Manganese ions oxidize and precipitate out of solution causing problems of root staining creating nutrient absorption deficiency. This process is exacerbated when the water is sanitized with UV light or chemicals.
- Magnetic devices in the nutrient flow will attract and remove Iron oxide, keeping the plant root systems and sterilizers cleaner. This in turn leads to a cleaner root system, improving nutrient uptake and consequently greater yield and growth rate.
- Magnetized produce looks better, healthier and more defined in color and, tastes better.
- Magnetized water improves the resilience and eliminates many traditional blight.
- Magnetic irrigated plants produce increase their shelf life maintaining appearance and flavor.
- Magnet irrigation produces a significant increase in produce size and defined shape, whilst retaining all other benefits.

General advantages of incorporating magnetic devices within water irrigations systems:

- Vegetation period decreases by 15-20 days, therefore the crops ripen 15-20 days earlier than normally.
- Crop production increases from 15-20% to over 70%, in some cases.
- Plant disease rates drastically decrease.
- Taste of agricultural produce improves.
- Approximately 30% less water is needed for irrigation
- Therefore 30% less energy is used in water pumps.
- Brackish water can be used for irrigation (from 2-7 thousand PPM inclusive) and for some species, higher ppm can be used (upto 15 thousand inclusive).
- By magnetizing seeds before sowing and by irrigating them with magnetic water, germination improves by excess of 30%
- Average of 30% decrease in fertilizer consumption is required.
- Active soil desalination takes place, increasing crop production year after year.

Note for engineers: Installation of magnetic devices on pumps, increases efficiency of pumps and pipeline capacity by 30%.

Animal Breeding
Poultry and Fish farming
Bee Keeping

Animal Breeding

Use of magnetic technologies in dairy production has the following benefits:

1. Change in production processes of yogurt, cream, butter, cheese

- Reduces time of production process
- Improves taste properties
- Increases shelf life of finished products

Since each production process has its own specifications, we need to do the following:

1. Study in detail you production process and products.
2. Determine the most desirable areas of activity
3. Select the right equipment

Many years of practice allows us to assert that a combination of the above enables to obtain an economic effect on average around 20-30%.

2. Solubility of dry milk.

Experiments involved using magnetized water to dissolve dry milk powder (before powder dissolves) and solution of water powder. It has been established that solubility increases significantly. Amount of raw sediment is reduced by about 1.5 times.

3. Structural and mechanical properties of starter cultures and fermented milk products.

It is found that by increasing magnetization time, levels of whey production proportionally reduce and viscosity of starter culture increases. Depending on a type of starter culture, the degree of syneresis is reduced by 25-35%, respectively viscosity increases by about 40-45%. This method can be used in the manufacture of dairy products by enducing consumption norms.

In the production of cottage cheese from magnetized milk, amount of protein in whey reduces by about 20-25%, respectively increasing the amount of protein in cottage cheese.

4. Growth and development of yeast cells.

Research shows that magnetic fields have a positive effect on biochemical activity of yeast cells in a combination ferment.

Produce made using a combination ferment have higher alcohol content, more volatile fatty acids and carbon dioxide, higher degree of dispersion and better digestibility of the product.

Magnetization using magnetic systems increases shelf life of dairy products by almost two times.

Experiments also tested electromagnetic systems which researchers abandoned due to poor results.

Effect of a constant magnetic field on the yield of protein products

Increasing production efficiency depends on methods of processing raw materials. In this case savings of material resources is extremely important.

Food and dairy industries often use processing methods such as microwave field effects of ionizing radiation, infrared excitation, ultrasound-treatment and treatment with constant magnetic field. The latter method has many advantages as it does not require electrical supply, adjustment during operation, reconstruction or modernization. Magnetic systems are structurally simple, easy to install, do not require special operating conditions and are safe to use in food biotechnology with a magnetic induction in the center of the working gap 40 +10 mT.

Treatment using magnetic field has been applied in many areas of national economy and medicine.

The aim is to study the influence of magnetic field on redistribution of protein at different stages of its formation.

There is a lot of research on behavior of milk proteins at pasteurization, sterilization, enzymatic treatment and mechanical stress. It is well known that the most unstable is a protein fraction, precisely a part containing more unstable hydrogen and Van der Waals bonds.

We have studied the influence of magnetic field on the redistribution of protein fraction into whey using magnetized milk or ferment in the production of acidophilus drink (see Fig.1) or magnetized milk in the production of cottage cheese prepared using different methods of coagulation (see Fig. 2).

Fig. 1

Magnetic field (40mTl)

↓

Milk

↓

Pasteurization

↓

Cooling t = 40 ° C

↓

Souring, τ = 4-5 hours

↓

Allocation of serum t = 50C, τ = 10 minutes

↓

bezkainovaya serum unclarified serum

Thermocoagulation
of serum proteins

t = 595-97S,

Γime 20 minutes

Whey proteins Proteose peptone fraction

Fig.2

Hlorkatsievaya coagulation

Milk (magnetic field)

↓

Protein precipitation t = 95-97S, 0.7 ml of 40% CaCl 2, τ = 5 minutes.

↓

Separation of serum V = 3 m / v, τ = 10 minutes

↓

Casein Free Serum protein

Rennet-acid coagulation

Milk (magnetic field)

↓

Pasteurization

↓

Cooling t = 32C

↓

Coagulation protein (1% + 2.5 leaven ml of 2.5% solution of SF)

↓

Separation of serum (cutting and endurance 10 minutes)

↓

Separation of serum V = 3 m / v, τ = 10 minutes

↓

Casein Free Serum protein

Acidic coagulation

Milk (magnetic field)

↓

Pasteurization

↓

Cooling t = 32C

↓

Souring, τ = 8:00

↓

Serum separation V = 3 r / v, τ = 10 minutes

↓

Casein Free Serum protein

In casein-free and clarified ferment, content of water-soluble protein was determined by spectrophotometry in UV area.

Protein content was calculated using formula:

C = 1, E 45 280 - 260 0.7%

Yield of casein was determined by weighing, followed by recalculating it onto given humidity (80%) using formula

Mpriv. = Mkaz. * Wf / 80

Table 1 shows the effect of magnetization on a transition of protein fraction into whey in acidophilus product.

Table 1.

Type of serum	Control	Experience	
		Magnetized milk	Magnetized milk
Casein Free Serum	0.6797	0,614	0,576
Protein-free serum	0,348	0,265	0,227

Note: The total protein content in milk - 2.9%

Data in Table 1 shows that regardless of the magnetization method, moment of separation of the clot into protein mass using magnetized milk gives additional 12% of protein; and using magnetized fermentation gives additional 18% of protein.

Significantly increases amount of denatured whey proteins. After exposure of whey fraction to a magnetic field absorbing UV-light at λ260 and λ280 NM, protein content reduces by 24% (magnetized milk) and by 36% (magnetized ferment).

Similar results were obtained by methods of protein coagulation (see Table 2). However output pattern remains the same- during calcium chloride coagulation amount of protein transition increases by 48.3%, during rennet-acid coagulation by 26.3% and during acidic by13%.

Table 2.

Effect of Permanent Magnetic Fields on yield of protein mass.

		Balance products					
	View coagulation	Milk	Serum	Protein			
				Weight	% W	When the Vedas. W	Growth
Control	Hlorkalts	245.8	186.6	47.9	74.5	44.6	-
	Sych.kisl.	258.2	186	49	67.7	41.5	-

	Acid	258.2	190.3	44.7	68.8	38.4	-
Experience	Hlorkalts	239.6	161.9	72.8	72.8	66.2	148.3
	Sych.kisl.	256	176.4	59.6	70.2	52.3	126.2
	Acid	258	188.5	46.5	68.1	39.6	113.1

By applying magnetic fields on a system containing colloidal particles in the presence of Brownian motion and charged particles, a Lorentz force is created which tries to bring particles together, ie, under the influence of this force particles can overcome the potential barrier of the repulsive forces more than smaller initial particles. Growth in the size of the particles suggests that forces of molecular attraction of aggregated particles also increased, therefore associate is more watercut compared to initial particle and it aggregates. Therefore treatment of milk prior to fermentation or thermo-coagulation with magnetic field is a processing method with a lot of potential and can be widely used in the industry.

Department "Technology of milk and milk products." Vasilyeva RA, Ulan-Ude, 1999.

Archive: The use of magnetic technologies in animal breeding.

1. 'Don' Farm. The introduction of automated dispensing liquid feed have resulted in spoiling of food inside pipes between feeding intervals. In order to extend the shelf life of feed and to maintain its nutritional properties, a magnetic system was installed on pipes. Where half of animals were given magnetized feed, and the other half was given non-magnetized. As a result magnetically treated feed retained its original freshness and increased average daily gain by 18%. Animals given magnetized feed had better digestion, higher hemoglobin and red blood cells count and lower rate of disease. (Cc / agricultural sciences. Yu.Bogomolov)

2. Sumy Agricultural Institute. In 2010-2011 he (sg / h.n.A.Belsky). Application of magnetic devices significantly improves the effectiveness treatment of mastitis in cows, improves elasticity of the udder and makes it easier to milk the animals. Animals drinking magnetized water have more yield and higher fat percentage of milk. In addition magnetized milk has double the shelf life as and keeps well in transit.

3. GPPZ "Bolshevik", 2012. Surface magnetization of eggs with a magnetic files increases hatch rate by 1.1% and is beneficial in further development of chicks.

4. Association "Checheningushvino." 2013. Industrial experiments conducted using magnetized feed for pigs. Average daily weight gain compared to control were as follows: 52.2% in the two-month old piglets, 30.2% in three-month old piglets and 1.5% in ten-month old piglets. This confirms the hypothesis of the author that a greater effect is achieved when larger quantities of liquid are being magnetized and at earlier stages of development.

In addition, there was a significant increase in barley harvest, when seeds were magnetized prior to sowing. Results were as follows:

- Magnetization of seeds on the day of sowing, harvest increased by 4.0 t/h.
- Sowing seeds 5 days after its magnetization, harvest increased by 1.8% qt/h.

B. Perelyakov.

5. Ivanovsky Institute of Agriculture, 'Lesnaya' Poultry Farm. In 2011 an experiment was conducted magnetizing poor quality drinking water that that did not meet GOST 2874-83 requirements, in order to improve its quality.

Water was treated by a permanent magnetic field of 48 mT. As a result, water content had significantly less iron, nickel, nitrogen, ammonia and nitrates. It had higher pH, lower acidity. As well less biological oxygen uptake and less bacterial count. These changes indicate a significant improvement in health qualities of such drinking water.

An experiment involved giving magnetized drinking water to ducklings. In relation to the control group, results in ducklings drinking magnetic water were as follows:

- increase in hemoglobin by 1%
- increase in erythrocytes 0.3 mil
- increase in leukocytes 4,000
- increased in reserve alkalinity of the blood plasma by average 50 mg%,

- increase in plasma protein 0.2 g%
- increase in albumin at 6.3% and
- 3.2% increase in haemoglobulins

These hematological parameters show an increase in the body's defenses (natural resistance). This was confirmed by a decrease in mortality rates of ducklings by 5% with a significant increase in its average daily gain.

G.Tyurev

6. Voronezh Agricultural Institute, “Ptitseprom." Experiments were conducted on two poultry farms in order to investigate the bio-stimulation effect of magnetic water on productivity of birds: one half of each farm chickens received normal water (control) and on the other – magnetized water (test). In the two years 48,000 chickens were examined. Average egg production in chickens drinking magnetic water was 7% higher than chickens that drank normal water.

7. JV between NIIGiprohim and the St. Petersburg State Agrarian University (Yu.M.Sokolsky, L.I.Zinchenko) conducted two set of experiments, each set had two groups, each group consisted of 8 rabbits (White Pelican variety). Test group was given magnetized drinking water, food cooked using magnetized water and food grown under irrigation with magnetized water. Control group had the same dietary conditions as a test group but used only normal water for all requirements. Results showed that compared to test group, control group had better digestion and absorption of food by 4 %, its average daily gain increased by 10%, improved taste of meat and quality of skins also control group consumed 50% less drinking water.

Research shows that magnetized water is more biologically active, more soluble and aids in the removal of toxins, as well as it better absorbs inorganic salts.

Also irrigation with magnetized water increased yield of cereals-legume mixture by 40% and altered its content of sodium, magnesium, zinc, copper, nitrogen and phosphorus.

Magnetic treatment in meat production

Introduction.

This manual applies to the technological processes for the production of cooked sausages, frankfurters, sausages and meat loaves, the requirements for which are provided with GOST 23670-79 and technological instruction for the production of sausages, developed VNIIMP and adopted on 16 November 1993 (hereinafter - the Regulations).

In addition to the regulations set by the said Regulations, a real technological instruction sets the sequence of the production of sausages with the magnetization of the source of raw materials.

At the heart of the practical use of magnetic treatment of aqueous solutions and mixtures are changes in the activity of their physical and chemical processes, the recovery of smaller structural uniformity, high fluidity and dissolving ability; such a uniform textured liquid increases ability to penetrate the micropores of the tissue, restoring the desired moisture content and keeping it up to maximum state, saving the desired specific humidity; and this is the basis of good quality of all food products and meat in particular. Magnetization of food during processing, as well as the magnetization of the raw material and water used for technological purposes, produces environmentally friendly products.

Typically, these products has a prophylactic and therapeutic effect and significantly improves organoleptic properties, increasing shelf life, reducing consumption and increases comprehensive range of properties and material yield (30%).

The effect of the magnetization in the manufacture of sausages primarily affects the degree of stabilization of mince consistency and preservation of its moisture. Traditionally phosphates are used as stabilizing agents of sausage mince. Magnetization of water, raw materials and source components eliminates the need for phosphate use, which ultimately makes the product healthier and environmentally friendly.

Established sanitary regulations for the meat industry on March 27, 1985 № 3238-85. Drinking water in accordance with GOST 2874-82

3.2. Magnetizing water, raw materials and spices eliminates the need to use phosphate.

3.3. An important factor in the manufacture of sausages using magnetization of water and raw materials is increased percentage, average by 15-30%, dosage of water (ice) added to a process of mince coating.

Legislation on using magnetic water when feeding calves

December 13, 1984
The Republic of Bulgaria

A magnetic device M30-40-1, was tested and then successfully implemented in Bulgaria at agri-industrial farm Burgas in September 1984.

A magnetic device uses permanent magnets to enhance quality of water and water systems. Magnetically treated water acquires new characteristics such as improved dissolving ability (due to breaking down of water clusters into smaller particles), which helps stimulate the growth of plants and animals.

The effect of magnetic water on weight gain of young calves was tested on Burgas farm in Bulgaria, from 09/24/84 to 14/12/84. The study included two groups of 3 months old calves (control and test), 30 calves in each group.

Test group received magnetized fodder and water. Feeding rate, timing, and the portions were the same for both groups. The animals were kept in pens of 10 calves/pen.

The experimental data presented in the table below:

Controlled performance	Groups of animals		Effect%
	Test	Control	
Number of calves	30	30	
Total weight before experiment, kg	4370	4250	
Total weight after experiment, kg	5640	5295	
Average daily gain/group, kg	15900	12900	
Average daily gain/calf	0.530	0.430	23.2%

The use of magnetic water and forage in feeding of calves provides significant economic benefits.

Poultry Farming

Bacterial contamination and biofilms

Contaminated poultry products are one of the key contributors of food poisoning. Since foodborne pathogens, in particular Campylobacter, Salmonella, E. coli, Pseudomonas, and, Staphylococcus, can be spread throughout the flock via the drinking water. So the industry needs to adopt technologies that can prevent this from happening.

Biofilms are a complex matrix of bacteria, fungi, and algae bound together in a sticky gel of polysaccharide and other organic contaminants attached to a surface. The bacteria produce a slime layer in which they live that anchors them firmly to a surface and which provides a protective environment to grow and reproduce. Biofilms generally form on any wet surface and are consequently found in many types of environments, especially poultry drinking water systems. Biofilms harbor harmful microorganisms such as Campylobacter, Listeria, Salmonella, E. Coli, Pseudomonas, and Staphylococcus. The existence of biofilm reduces the effectiveness of common disinfectants.

Water soluble additives used in poultry drinking water often contain sugar or sugar additives that can promote the growth of a biofilm inside the water line. I

Organic materials and additives will supply nutrients for microbial growth and will have a negative impact on medication and vaccines delivered through the water lines. Every time the bird consumes water, it will become exposed to an ever increasing microbial load. Other negative effects of microbial growth include poor feed conversion, downgrading of carcasses, increased mortality and increased condemnation. This will affect the profitability of the integrator and the farmer.

Control of Biofilm using magnetic technologies

Magnetized water enhances properties of disinfectants. This allows them to be more effective in combating microorganisms in biofilms, as they are easily hydrolyzed on biofilm which causes removal of microorganisms.

Water sources, such as well or surface water that contain high mineral content, iron bacteria, or coliform, may produce biofilms. The use of vitamins or other sugar based products (Gatorade, Kool- Aid, etc.) is a food source for the microorganisms and will promote the formation of biofilms as well. Problems associated with biofilms in the poultry drinking water include a decrease in poultry survival time, lowered egg production, deterioration of equipment, and clogging of nipple drinkers.

Utilizing public water systems or a applying a disinfectant throughout the growth cycle (Chlorine gas, chlorine dioxide/anthium dioxide, iodine, or ozone) will not make a farm immune to these biofilm. Traditional disinfectants do not effectively penetrate the biofilm matrix. The disinfectant must have access to the bacteria in order to be effective. Most disinfectants are active against planktonic (unattached) microorganisms but are not effective against microorganisms in biofilm. In order to

penetrate and remove biofilms, it is necessary to hydrolyze the biofilm matrix. Hydrolysis breaks up the biological material and exposes the microorganisms within it to the killing action of disinfecting agents.

Commonly utilized treatments in the industry that are not effective against biofilm:

- Quats are surface antimicrobials. They have no chemical reactivity with biofilm polysaccharide and are bound up by negative charge on the biofilm surface. Quats leave much of the biofilm matrix intact and do not remove or destroy endotoxins.
- Chlorine Dioxide is a strong oxidizing agent. Chlorine Dioxide reacts with the surface of the biofilm but provides no hydrolytic breakdown of the biofilm matrix or mechanical removal.
- Peracetic Acid is active on surface regions of biofilm, but is rapidly neutralized by catalase. There is no hydrolysis or mechanical breakdown of biofilm matrix polysaccharides.
- Citric acid, muriatic acid, sodium hydrogen sulfate, and other acidifiers used to lower pH are neither approved biocides (ability to kill microorganisms) nor bio dispersants (ability to penetrate and remove biofilms). These products are effective at removing scale as discussed later.

Scaling within infrastructure

Scale formation on the inner surfaces of water supply lines is mostly due to water hardness, and is usually associated with the groundwater in the regions where the composition of rocks contain a significant portion of minerals such as calcium and magnesium bicarbonates and sometimes iron and manganese. Over time, water containing these minerals will attach to plumbing and form scale. Rust, dirt and algae will attach to the inside lines. Also rough surfaces contain cracks and crevices harboring microorganisms.

Disinfectants such as chlorine and iodine, are not effective because they cannot penetrate, they simply pass through cracks and crevices. Thus, microorganisms continue to thrive. Therefore it is necessary to adapt a program to address this microbial infection by providing farms with high quality water.

Prevention of scale formation using magnetic water

Scale is formed because of water hardness, which leads to the formation of deposits made of soluble salts of rigidity. It is possible to prevent the formation of scale by changing the physical structure of these salts. Magnetic treatment changes the structure of molecules of water, which enhances solubility of salts.

For example, in a modified structure of magnetized water, crystals of calcium carbonate grow as "aragonite calcite ", as in ordinary water. Unlike calcite crystals, aragonite crystals have lower adhesion to each other and less spikes on the surface of pipes. Thus, salts remain in suspension which prevents scaling. Due to this water lines, sprinklers and cooling pads will work more efficiently.

Formation of bacterial slime, which scale usually ‘feeds’ on, also decreases.

Benefits of using magnetic water for drinking purposes:

- Improves process of bone formation
- Improves morphology of blood.
- Decrease by 2-3 times of death rates of chicks.
- Increased feed conversion.
- Reduces the required feeding period.
- Target weight is achieved with a minimum of 10% of feed.
- Increase of their mass (average weight gain increases by 5-7%).
- Egg-laying qualities increase by 10%.
- Taste of meat improves.
- Better quality product.

Return on investment

- Average size of poultry farm: 7,500 birds
- Average daily water consumption per bird: 275 ml
- Average food per bird for 40 day life cycle: 4.5 kg
- Cost of feed per kg: RS 25
- Sewage treatment water (daily): approximately 1,500 liters

1. Magnetic device: U050 (½ inch diameter), 350 m3 / h.
2. Amount of magnetized water in a 12 hour period: 4,200 l/h
3. Daily requirement of water for drinking and cleaning: 3,600 l/h
4. Price of magnetic device U050: RS 16,000 (including customs and local tax).
5. Note: The device can be used within 24 hours and flow rate can easily support 400 l/h

Aim: to achieve target weight of poultry, while reducing the amount of feed and reducing mortality rate.

Assuming target weight will be achieved with the use of 10% less feed, then:

- Total cost of feed for 1 bird on the whole cycle: RS 112.50 Paisa
- 10% savings on feed cost: RS 11.25
- Total savings achieved from 7,500 birds: RS 84,375
- Price of magnetic device: RS16,000
- Return on investment after 40 days of use: 500%

Equipment Warranty: 10 years

No maintenance required, only periodic cleaning (regular washing with water to remove natural impurities blocking the passage).

India

In the last decades the livestock sector has been one of the fastest growing sectors in Indian agriculture, currently accounting for about 25 percent of agricultural GDP as compared to less than 14 percent in 1980 (GoI, 2006b). Both, demand and supply side factors are responsible for the growing importance of livestock in Indian agriculture. These drivers include income growth and urbanization, advances in production and processing technology and improvements along the supply chain" (Khan and Bidabadi, 2004; Narrod *et al.*, 2008; Pingali, 2007).

"Within the livestock sector, poultry has been the fastest growing sub-sector: between 1985 and 2005 poultry meat and egg production grew by about 12 and 5 percent per year, compared to an annual growth rate of 1.5 to 2.0 percent for beef, milk and mutton and lamb. At present, with an average annual consumption of 1.5 kg of poultry meat and 1.8 kg of eggs (35-40 eggs) per person, exclusive of milk though, poultry meat and eggs contribute almost 50 percent to the per caput consumption of animal protein" (GoI, 2006b).

Enhancement

Consequently any form of enhancement will significantly contribute to general food and income sustainability for families, the local community incomes and the wider commercial benefits derived from provincial high capacity factory farming.

Summary of Magnetic benefits of Chicken, Ducks, Geese:

- Reduces mortality rate
- Lessens the Feed Conversion Ratio
- Stabilizes the food intake
- Shortens the required nourishment period
- Increases size and health

All aimed at a higher performance index Using magnetic water for drinking purposes of chicks results in an increase in the process of bone formation. As well as, improves morphology of blood. Magnetic water increases growth and development of poultry: decrease by 2-3 times of death rates of chicks and an increase of their mass (average weight gain increases by 5-7%), egg-laying qualities by 10%.

Poultry and Water Fowl Rearing

Water is needed for: bird consumption; reducing air temperature; (including evaporative cooling pad and fogging systems) and facility sanitation. Broilers consume approximately 1.6 to 2.0 times as much water as feed on a weight basis. Water is a critical nutrient in bird metabolism and nutrition. From a physiology perspective, water consumed by the bird is used for nutrient transportation, enzymatic and chemical reactions in the body, body temperature regulation and lubrication of joints and organs.

Environmental Temperature/Heat Stress: Birds consume more water as temperature increases. One of the main ways birds regulate body temperature is by

evaporating water through the respiratory system during panting. As birds pant, water is lost and needs to be replaced in order to maintain body- water balance. Water consumption can double and even triple during periods of heat stress. Water consumption in broilers increases approximately 7 percent for each degree Fahrenheit increase in temperature.

Water Temperature: Several studies have examined the effects of providing cool water to birds during hot weather. In most of these studies, water temperature has improved the performance of broilers and layers. Any water temperature below the body temperature of the bird will be beneficial. The water consumed will help dissipate body heat and aid the bird in body temperature regulation. However, it is very difficult to cool the water significantly when moving the water hundreds of feet down a house.

Electrolytes: During periods of potential heat stress, many producers supplement drinking water with electrolytes. Electrolytes are minerals that can be found in the blood and are important for normal cell function and growth. Electrolytes, as the name implies, help regulate nerve and muscle function by conducting electrical signals from nerves to muscles. Electrolytes are also important for the acid-base balance of the blood and fluid retention. Some of the electrolytes found in blood plasma include sodium (Na), potassium (K), calcium (Ca), magnesium (Mg), chlorine (Cl), bicarbonate (HCO_3) and sulfate (SO_4). The addition of the electrolytes not only replenishes those depleted during heat stress, but also stimulates water consumption. When the results of these are added together (electrolyte intake and increased water consumption), the mortality due to heat stress can be reduced.

Bird Metabolism: The correlation of water consumption with feed intake and many environmental factors indicate its importance in bird metabolism and body function. Efforts should be made in all poultry operations to ensure that adequate and unlimited access to water is provided. Failure to do so will result in reduced feed intake, poor egg production, and reduced growth and reduced feed efficiency.

Water quality should be of concern to all poultry operations. Poor water quality may interfere with digestion and subsequent bird performance. The effectiveness of vaccines and medications administered through the water lines could be reduced when water quality is poor. Water contaminants could create equipment problems that would either restrict the amount of water available for consumption or the effectiveness of the evaporative cooling and fogging systems. Reduced water consumption or cooling capacity may have detrimental effects on both growth and reproduction. Poor water quality could also result in leaky water nipples inside the house, which will wet litter and lead to increased ammonia production. Poor litter quality and high ammonia can result in reduced performance and livability.

Water is one of the most important components of growth and development of birds, animals, plants and all living organisms. Rapidly growing birds often consume twice as much water, as the water dilutes the feed and transports nutrient to the cells.

Since molecules in magnetized water are independent, solubility and transport of nutrients in such waters is significantly higher. Since single water molecules can easily carry nutrients through tiny pores of cell membranes for its absorption and assimilation.

Aquaporins - specialized protein which supports channels in cell membranes and facilitates the passage of nutrients easier when passing through individual water molecules. However the overall hydration cannot be achieved by system of reverse pumping, since this technique can not break hydrogen bonds of the molecules. Therefore magnetized water alone plays a key role in enhancing utilization of blood, oxygen and nutrients in different tissues and cells.

Magnetic enhancement of water supply

Scientific research was carried out by the scientists of "Magnetic Technologies" company that described the effect of magnetic water on the growth and development of some bone structures of chickens and animals.

Installation of magnetic system for indoor intensive farms

Taking into a consideration that the industrial production of poultry in all cases, except waterfowls/water birds, occurs in closed buildings, and waste of water for drinking purposes is insignificant, magnetic devices should be installed on water pipes close to the drinking apparatus Usually, a device of 0,5" can be installed on a water pipe.

Installation of magnetic systems for free range poultry

The choice of a magnetic device for waterfowls/water birds occurs by using the same method as when choosing a device for fish-breeding in open lake.

Water consumption increases with age. Poultry production is more competitive than ever before and clean water will surely make a difference in the profitability for the grower. Magnetized water can reduce overheads and increase volumes of meat and eggs, making it more profitable for farmers.

Magnetized water is more penetrating, it improves better assimilation of the various nutrients and vitamins in the cells. It also increases solubility of minerals and therefore improves the transfer of nutrients to all parts of the body, making the organisms work more efficiently.

- 2-3 times lower mortality rates
- lessens the ‘feed conversion ratio’
- stabilizes food intake
- shortens the required nourishment period
- increases size and improves immunity
- overall quality of meat in texture and taste improves

Fish Farming

Benefits of using magnetic treatment in Fish Farming.

In order to increase productivity, a study on the effect of magnetic fields was carried out. Magnetic systems were used to create magnetic field of 40kA/m, MM30-40 with 1 and 2 inch diameters and capacity 1m/sec.

Magnetic treatment of water had a favorable effect on fish and enabled for an oxygen content increase in water by up to 5g/l. Also had a positive effect against pathogenic bacteria in water, thus reducing disease in fish.

Results of magnetic treatment:

Conditions	Gained weight, %	O2 in water	Fish mortality, %	Fish morbidity, %
Water without magnetic treatment	100	1	36	60
Water with magnetic treatment	155	4.4	28	30
Feed with magnetic treatment	188	4.2	12	0
Water and feed with magn.treatment	155	4.8	12	25
Water, feed and sh with magnetic treatment	220	5.4	8	0

Therefore it is highly beneficial to systematically magnetize water-feed-fish as a whole. As a result of this method, weight gain of fish more than doubles without any additional expenses.

Technology of magnetic treatment with closed loop water supply.

Treatment of natural and waste waters.

The latest technology of water disinfection of domestic and industrial effluents, was created on the basis of conversion developments using hydrodynamic magnetic resonance effect, ultraviolet light, ultrasound and acoustic vibrations to achieve complete destruction of pathogenic organisms.

These physical factors act simultaneously in one unit of "Edelweiss-M" system.
EDELWEISS Technology is unique. Its main advantages are:

- Small footprint
- Little time for complete treatment
- Low energy costs
- No chemicals
- Fully automated

Operation and main characteristics

There are three physical methods of influence of the treated water - hydrodynamic magnetic resonance, ultrasonic cavitation and ultraviolet radiation. These provide almost complete disinfection of water. Resonant destruction of cell membranes in a magnetic field, high temperature and pressure in the cavitation zone, and photochemical oxidation, cause devastating effects on bacteria, viruses and microorganisms.

1. Use of magnetic hydrodynamic resonators (using permanent magnets) enables to:

- Significantly reduce energy costs for decontamination of natural water and wastewater by ultrasonic cavitation and ultraviolet treatment
- Ensure the structuring of the treated water and enriching it with biologically active properties

2. During a simultaneous exposure by a magnetic hydrodynamic resonance, ultraviolet radiation, ultrasound and acoustic oscillations of the aquatic environment, creates powerful4 oxidizing agents, uniformly distributed over the treated volume. This enhancing the efficiency of the system by 103 times and completely destroys (full photochemical oxidation) any shape (in including spores see. Table 3), microorganisms, viruses and protozoans (see Table 4) at concentrations up to 106 U / l. Conventional UV technology (exposure time inside a system of no more than 1.5 sec), and also on large productions - ozonation, are not able to suppress these types of microorganisms. The effect in conventional technologies of UV and ozonation is achieved at very low concentrations (units in 1 liter) of spores and protozoa with prolonged exposure, and almost does not eliminate mold.

3. The difference of UV treatment of water using proposed technology is in as a short-wavelength (253.7 nm) and vacuum ultraviolet light (185 nm), enabling almost complete disinfection (up to 99.999%), killing of bacteria (see Table 1) and viruses (See Table 2). The results are far better than using conventional technologies that use long wavelength ultraviolet range and oxidation with ozone. Also its energy intensity is 3-4 times higher than that of EDELWEISS technology.

4. The technology enables, directly in a flow, to disinfect sludge pulp, and 100% kill worm eggs. Obtained at the output water carries fertile silt a complex fertilizer, which is composed of organic compounds as well as a wide range of inorganic components, including trace elements. Using sand filter at the output helps to separate silt. Which can be used as a high quality complex fertilizer immediately after drainage (water removal) and drying. There is no need for lengthy and expensive stages of biological or natural decontamination. Chemical and bacteriological analysis confirmed the ecological purity and high efficiency of this type of fertilizer. It is cheap and can be a profitable business.

5. EDELWEISS is not subjected to bio-formations and solarization.

6. The energy cost for wastewater treatment is not higher than 0.02 kWh/m3 (excluding power pumps).

Magnetic treatment of bees

Varroatosis and its treatment

Diseases of insects can be serious as those in humans. One of the most common is Varroatosis in bees. We address not only treatment of the disease but the use of integrated measures aimed at maintaining the hives in a healthy and active state.
Every beekeeper knows that preservation of a bee colony takes a lot of time and effort. It is important to not only to look after cells, but also to prevent the spread of dangerous diseases that can lead to disastrous consequences which can completely destroy the hive.

Bee Varroatosis cando just that, it is caused by a parasite Varroadestructor which affects larva, pupa and adult honey bees, inhibiting normal growth, development and functioning of the body.



This causes various defects in insects, some even do not form legs. This disease needs to be seriously addressed.
In order to diagnose, it is necessary to examine the hive. It can be done by examining a randomly selected number of bees in special plastic boxes or ordinary jars.

Infected bees will have brown oval formations on the abdomen, at the base of the wings and on the cephalothorax. Similar dark spots can be observed by examining pupa in a cross section of honeycomb. Whereas removable hive pallets will have such which are a female tick itself without a carrier. Therefore monitoring health of a bee family is extremely important as it is where treatment of Varroatosis starts.



The disease develops sequentially in 3 stages:

Stage 1: when infected 0.5% of the total number of bees in the hive. Family life at this stage is not different than normal.
Stage 2: affecting up to 20% of bees, leading to a weakening of a family life and activity.
Stage 3: more than 20% of bees are infected and begin to leave their hive.

Treatment of varroatosis can start in the spring, summer or fall and can involve chemical, physical (the most labor-intensive) and zootechnical. Using chemical method is effective and very simple, it involves treatment of bees with acaricides that kill harmful ticks.
Common types are: Apifid, Apistan, Fumisan, Akarasan, formic acid, Amitai, Varroatin, Dilabik, Bipin, Peritsin, thymol, etc. It can be sold in powder or solid form.

Physical measures include overheating of bees and the use of magnetic gates or magnetic notches. This has been repeatedly done by the author and had always received great reviews from beekeepers as it would increase quantities of harvested honey and improve its taste. Also it is important to install special magnetic drinking stations which are simply containers with magnetic water. According to many client reviews, bee behavior changes and given a choice they will go to a magnetized water source as opposed to the one with ordinary water.

Whereas zootechnical method involves extraction of the infection source to prevent further spread, followed by systematic examination of bee colonies.

Archive

Application of magnetic technologies in agriculture

1. In 1983-1984 government carried out a set of agricultural studies in Saratov, Volgograd, Astrakhan, Krasnodar and Stavropol, which involved using magnetized water for crop irrigation. A permanent magnet, AMOV – 3, was used. It resulted in average yield increase of 12.2% relative to the control group Yield increase using magnetic devices for water treatment was 26.5% and required water consumption reduced by half.

2. Volga Research Institute of selection and seed production. In 1985, pre-sowing seed treatment reduced disease of plant stems by 68%.

3. Department of Agriculture Pohvistnevskogo executive committee. In 1984 conducted a test of seed treatment prior to sowing and obtained the following results:

- Barley, area of 2,368 hectares - increase of 1.6 t/ha
- Wheat, area 687 hectares – increase of 1.3 t/ha
- Oats, area 200 hectares – increase of 1.3 t/ha
- Soaking sugar beet seeds in magnetized water increased germination by 42%.

4. Winery ‘Zaporozhye’, Krasnodar region. In 1985, grapes "Rkatsiteli" were irrigated using magnetic water (tree times) on an area of 9.6 hectares. This has resulted in a yield increase of 7.4 t/ha.

5. Ukrainian Agricultural Academy. In 1983, used fivefold magnetized irrigation water of medicinal plants and obtained the following yield increase:

- Chinese magnolia - 36%;
- Ginseng root- 31%

6. Training and research farm of Moscow State University in Chashnikovo village. Studies took place from 1981 - 1983 using magnetized water for irrigation of feed crops. The following increase in green mass was obtained:

- Beet - 21%;
- Corn - 31%;
- Sunflower - 21%.

7. State Farm Kuban Krasnodar region. Irrigation of land using mineral enriched waters from a local river have led to formation of salt incrustations on the surface. Whereas no such formations were recorded on land where magnetic devices were used, desalination effect was 300-400%.

8. Novokubansky and Novopokrovskiy district of Krasnodar region. Irrigation of sugar beets using magnetized water has increased yield by 1% and increased weight and dimensions of the roots. Also vegetation period reduced by 3-4 days in feed crop and 5-6 days in rice.

9. Advance germination and subsequent development phases after magnetization of seeds occurs before earing phase, after which the development of the control plants leveled. Pre-sowing magnetization increased leaf surface by 32.1% in barley, millet by 20.3%,. It also increased chlorophyll content in barley by 8.6% and in millet by 32%. On average, between 1981-1983, pre-sowing magnetization increased yield of spring barley by 5.4 kg / ha, and millet by 5.1 t /ha with a simultaneous increase in the protein content of barley grain by 3.0% and millet by 1.5%. More substantial increase of protein in grain observed during slight increase of the relative yields. When there was no increase in the mass of yield, there was still an increase in nutrient levels of the yield. (DS / agricultural sciences. V.Orlov).

10. 'Sumski 'Agricultural Institute. In 1982 - 1988 h (.A.Belsky) a study was conducted on the use of magnetic devices in production of cherry juice. As a result, magnetically produced juice had better taste, better sugar to acid ratio and longer shelf life. It also acquired health benefits, i.e. 5-6 kg of magnetized cherry juice, taken for three weeks on an empty stomach, activated digestive enzymes and enhanced build muscle mass function by 15-20%, increased exchange of CO2 in the lungs.

Using magnetic devices for growing of seedlings had the following results:

- Magnetized seeds of apple and cherry germinated on the 9th day, and control – 31st day
- After the appearance of the fourth leaf and secondary root,
- Magnetized plants had total height of 46 cm, and control - 18 cm.
- Increased water retention

- Increased concentration of cell sap and sugar by 27.8%, which made it possible to zaokulirovat magnetized plants in the same year, and control- only in the following year.
- Standard and the number of apple seedling material increased by 3 times, and it could be okulirovat in the year of sowing.

Memory of magnetization in plant cells of seedlings remains throughout the growing season – according to scientists from Sumski Agricultural Institute. The roots of the first order, emerging from the main root, align parallel to the magnetic field of the Earth: South - North and fibrous – absorbing system actively grows in the direction of East to West. According to law of morphological parallelism, in fruit plants thickening of the crown or the appearance of the first branch starts from the east or west sides of the stem. The obtained results confirmed purposeful placement of rows in the gardens of the magnetic meridian South -North. Coherence of energy potential of trees doe not allow branches of trees to interwine and break during mechanical interference. When placing trees of different varieties in the same order branches become intertwined. Thus, only plants of the same type are able to be mutually stability.
Replanting of seedlings to another place with the orientation in the magnetic meridian gives 100% survival rate, which again confirms the mandatory incorporation of orientation as in magnetic field of the Earth and between seedlings.

11. Novocherkassk. In 1984, field tested watering tomatoes using magnetized water. Magnetic devices were installed on sprinkler DDA-100M. As a result, tomato yield increased by 57 kg / ha, number of fruit per bush by 1 - 2.2 pc and number of mature fruits by 31 pcs/bush, dry matter content in the fruit increased by 0.1%.

12. Don Experimental Station of oilseed crops in 1984 conducted experiments on the preliminary treatment of sunflower seeds in a magnetic device. Increase in yield was 4.3 kg / ha, plant density increased by 68%.

13. Don Experimental Station of oilseed crops in 1984 conducted experiments on the preliminary treatment of sunflower seeds in magnitotrone. Increase in yield was 4.3 kg / ha, plant density increased by 68%. D.s.h.n. D.Belentsev.

14. Volga Research Institute of Hydraulic Engineering and Land Reclamation. Since 1971 studies were carried out using magnetic water for irrigation. This has resulted in the appearance of wheat seedlings 3 days earlier than usual and speeding up of other phases of plant development. Magnetic treatment transforms mineral fertilizers into a more absorbable form.

15. Azerbaijan Research Institute of Hydraulic Engineering and Land Reclamation. When watering plots with sea water (14 mg / l of salts) after magnetic treatment the yield of tomatoes increased by 46.6%, the green mass of sorghum by 19.4%. When watering using fresh magnetized water the effect was not as significant, although quite evident i.e. yield increase of tomato was 11.4% and of sorghum was 10.4%.

16. Agro-physical Research Institute, Saint Petersburg. Using systems with permanent magnets for a purpose of desalination of alkaline soils , increase in coefficient of filtration, depending on the type of soil, was 20% to 2 times. In 1980-1984, the state farms in the Leningrad region of more than 3 hectares were tested by pre-sowing magnetization of potatoes. The average yield increase was 4.18 t / ha or23.8% whereas in other experiments increase was 35%. Also agricultural tests were conducted using pre-planted magnetization of carrot seeds, beets, radishes, cabbage, cotton, sugar beet, and others. The analysis of the experiments showed a yield increase of up to30% while dramatically reducing the timing of maturation and improvement in quality.

17. Kuban Agricultural Institute. Head of Department of Hydraulics and Rural Water Supply Ph.D., assistant professor Y.Skobeltsin studied changes in the viscosity of tap water in Krasnodar, Russia. This was done by magnetizing water using a magnetic induction at the center of the working gap 50 + 10mTl. The evaluation of results took place in droppers "UZGIPROVODHOZ-2" and"VODOPOLIMER-3 '. Analysis of the results showed a clear increase in fluidity of magnetized water compared to non-magnetized water by average of 30%. Increased flow and consequently increased efficiency of pipelines have been linked to a decrease in the viscosity of magnetic water and normalization of its structure.

Effect of magnetic water on growth and development of sunflowers, soy and mustard plants.

Scientific and technical staff
All-Union Scientific Research Institute of oilseeds,
1985, vol. 11 (89) Krasnodar
T.E.Guseva, O.N.Suhareva. T.S.Dubonosov.,
N.A. Volkonski V.S.Patrasenko . Y.P. Tkachenko

In recent years methods of magnetic and electro-physical stimulation on plants and seeds are becoming increasingly popular. Many researchers have observed that water under the influence of the magnetic field changes its physical and chemical properties: viscosity, density, dielectric permittivity, electrical conductivity and surface tension. Solubility of oxygen in magnetized water changes, which ultimately leads to increase of its biological activity when interacting with the living objects.

Magnetic fields increase elasticity of the cell membrane, which promotes faster germination. The effect of the magnetic field on passing thorough it water is expressed in its activation by increasing the number mono-molecules (V.V.Pilyugina, 1979; FYa.Polikarpova, V.V.Pilyugina, 1979; P.Penchev, 1978). Although physical, chemical and biological characteristics of magnetic water have not yet been fully identified, having the ability to increase the permeability of cell membranes opens up great opportunities for experimentation and subsequent practical use in agriculture.

An important feature of the use of magnetic water is its simplicity, accessibility, efficiency (especially when using magnetic devices with permanent magnetic fields).

The ability to magitically treat water used for irrigation purposes, opens up a lot of usage possibilities. Given the positive effect irrigation using magnetized water has on development and productivity of many agricultural crops, studies were carried out at the department of artificial climate in Krasnodar, Russia. Irrigation with magnetic water of mustard plants grown in climatic chambers, contribute to more productive plants with high coefficient of reproduction.
The table below shows that mustard plants irrigated by magnetized water throughout the growing season, had 1.5 times more branches formed, higher weight and 2.5 g more of seeds in comparison with to control plants, which were irrigated using tap water.

Experiment of using magnetic water for irrigation of Rice (1984)

Center of scientific and technical information and propaganda, Krasnodar, 1985

In order to study the effect of magnetic water on rice yield (Spalchik), one part of land was irrigated using magnetically treated water. Seeding date - May 10, predecessor - perennial grasses.

A magnetic device MM 40x180-40 was used to magnetize water (magnetic field strength 40 kA/m, overall dimensions 250h250h190 mm, productivity 200m/h).

On land irrigated with magnetized water, rice yield totaled 80.3 c / ha; compared to 70.7 kg/ha on land using ordinary water. Also vegetation period of plants irrigated by magnetic water was 5-6 day shorter.

Irrigation of rice using magnetic water had the following benefits:

- Improved grain quality
- 15% less consumption of irrigation water
- 30% decrease in use of fertilizers and herbicides, which improved environmental conditions.

APPROVED : Director of 'Naurski' Winery G.E.Petrenko, August 25, 1983, ACT August 20, 1983. "Naurski" Checheningushvino, Russia

We, the undersigned, chief agronomist A. Perelyakov, head reclamation department Ospischev, brigadier Aduev and engineer V. Perelyakov, confirm that that in the period of April - May 1983 tests were carried out on perennial grasses using magnetic water for irrigation.

Magnetic devices MM40 x 180 - 40 were installed at the suction pipe installations ДДН-70 and ДДН-100, used for irrigation of alfalfa varieties "Kizlyarskaya" second year of development, area of 90 hectares.

A neighboring control field of the same culture, area of 90 hectares, was irrigated with same systems but using ordinary water.

Irrigation of test and control areas was done under the same conditions and at the same time.

Chief agronomist A. Perelyakov
Head reclamation department Ospischev
Brigadier Aduev - Engineer V. Perelyakov

Head of operations - professor Y.Tkachenko

Healing properties of magnetic water

Drinking magnetic water has a positive effect on the entire body. Properties of magnetic water have been studied for more than 30 years producing a lot of research and evidence.

Research shows that magnetic water and other liquids have positive overall health benefits.

The mechanism of the magnetic water works by activating cell membranes, thus increasing penetration of nutrients into cells and removing toxic substances from the cells. Magnetic fluids primarily function to remove all the toxins from the body. Toxins and accumulated chemicals in the body are the leading cause of ill health and contribute to many diseases.

Therefore, the purification of the body is very important, not only of the intestine but also of other organs and bodily parts, which can be done successfully by drinking magnetic water.

Make it a rule to drink magnetic liquids as well as magnetizing water before making tea, coffee or soup. Not only will it improve taste but will provide health benefits to the body. It is easy to make a little test, prepare tea/coffee using normal and then magnetic water and compare the taste. Magnetic beverage will have a fuller, richer aroma and a smoother taste.

What effect does magnetic water have on the body?

1. **Cleansing liver and kidneys - from stones.**
   Magnetic water/fluids are the strongest natural stone solvents. Therefore it is used to treat gallstones, kidney stones and dental tartar. Consumption of magnetic fluids has helped many people to avoid surgery. It is also a painless process since the stone is not displaced but instead it simply dissolves.

   How long does it take to remove/dissolve stones?
   This depends on the size, quantity and type of stones. Small stones can dissolve or decrease in size after 1-2 months. Since drinking magnetic water has no contraindications, it is best it is consumed on a daily basis for longer period of times. Regularly drinking magnetic water even after dissolving the stones will add more benefits to your body and also prevent stones from forming.

2. **Detoxification of joints and spine from toxins and salts**
   Magnetic water is widely used to treat osteochondrosis, spondylosis, arthritis and other related issues.

3. **Clean blood vessels**
   The focus is on calcium salts that clog blood vessels causing sclerosis. Therefore it is important for people suffering from coronary heart diseases to regularly drink magnetic water. As well as for those who have had heart surgery and people with high cholesterol or high blood pressure. It is important to remember that magnetic water is not a medicine that works fast and then leaves the body. It is a gradual method for physiological improvement of cardiovascular system. In time you will feel better as your condition improves.

4. **Healthy intestine**

   There is a lot of discomfort associated with slagging of the intestine. Besides the fact that constipation is unpleasant, intestinal mucosa has reflex zones which correspond to different organs of the body and as a result toxins in the intestine cause harm to the entire body. Therefore, cleaning or flushing the intestine with the help of magnetic water, either by drinking or using enemas, helps to treat constipation, diverticulitis, colitis, flatulence, as well improves overall wellbeing.

5. **Removal of microbes - bacteria, fungi, viruses**
   These are found primarily in the gastrointestinal tract, such as ulcer causing bacteria, intestinal worms, fungi and so on.
   There are five areas which should be subjected to magnetic treatment:

- liver and kidneys - from stones
- spine and joints - from salts
- blood vessels - from salts and fats
- intestines - from toxins
- body - from microbes.

It is also recommended to use magnetic water for improvement or treatment of diabetes, allergies, prostate and menopause related disorders in women.
It is better to take any medication with magnetic rather than ordinary water, as it will improve absorption and its effectiveness.
Magnetic water balances the damaged cholesterol metabolism in atherosclerosis and improves condition, it is recommended to drink not only as treatment but as prevention of atherosclerosis. It is important to note that during magnetic treatment, physical-chemical properties change mainly in water, in which more salts are diluted. The healing properties of magnetized water are also manifested when taking medicinal baths or magnetic showers. Studies were carried out where magnetic water was used in showers, bath and swimming pools administered to patients suffering from hypertension. Those patients using ordinary water were told it had been activated with permanent magnets where in reality it had not. However, only patients using magnetic water had shown improvements. Thus the study excluded the placebo effect, where a patient feels 'therapeutic' action based solely on psychological factors. After a course of treatment with magnetic water, most patients had no headaches, tinnitus, fatigue and no chest pain. Almost all patients had improvements in blood pressure and better night's sleep.

Magnetic water helps remove tartar, prevents parodontosis and helps in treatment of abscesses. As well as helps prevent formation of dental plaque, cleans enamel and keeps gums healthy.
Research shows improvement in the treatment of urolithiasis and various skin diseases.

Magnetic therapy helps to treat fractured bones by accelerating healing processes. Significant improvement can be achieved by using a permanent troidal ring magnet to treat the affected area.
In the early 90`s in the USSR Conference on Magnetic-biology and Magnetic Therapy it was discussed in detail and positive effects were found on baths and underwater jet massage in patients with prolonged pneumonia unspecified infectious polyarthritis, rheumatoid arthritis and other joint diseases.

To help with treatment and prevention of mentioned above diseases, Magnetic Technologies Company has created specialized devices which harness Earth's magnetic fields, thus providing us with the protection created by nature itself.
All the mentioned above disease and problems that humans face in some period of their lives can be addressed and cured by using the magnetic devices for health, manufactured by company "Magnetic Technologies". The devices are manufactured from the natural magnetic energy of the Earth, and it enhances us with the protection created by nature itself.

Fuel modifiers

One of the main factors considered in pricing agricultural produce is the cost of fuel. Therefore fuel economy is paramount for any cost conscious any farmer.

The device is exclusively simple and easy to use and does not require any special maintenance.

Suitable for all engine types

Magnetic fuel modifier is suitable for usage with any kind of fuel (petrol, diesel, kerosene, liquid gas), and the result will always be positive. The device can be used for any kind of automobiles (cars, jeeps, motorcycles, trucks, buses) and sea vessels (yachts, boats, jet-skis, ships), boilers, large power devices, such as stoves for concrete production, thermal power stations, water-distilling stations, and generators.





Benefits

- Save 15- 30% of the liquid fuel.
- Increase 1.5 - 2 times the service life of engine oil.
- Extend engine life without major repairs by 1.5 - 2 times.
- Reduces CO2 emissions whilst maintaining operational and fuel efficiency of the vehicle

The Science:

In essence, the physical process is the operation of MHD dispersion of fuel. With the passage of fuel through the modifier due to its special design is a multiple pressure - speed transformations with simultaneous turbulence and magnetic treatment, which leads to the effect of cavitation. Magnetic cavitation is considered as one of the important factors for the perpetration of the crushing of the associates of fuel molecules down to small associate mono molecules. In general terms, as we know, a liquid fuel consists of a number of hydrocarbons and other organic compounds that are non-polar liquids and impurities in the composition of organic acids, resins, water, dissolved oxygen and other substances that are polar dielectrics. Therefore the interaction of polar molecules with the magnetic field as a result of orientation and dipole-relaxation creates the occurrence of mixing of the non-polar components of the fuel with oxygen and other polar impurities at the molecular level. Therefore with sputtering fuel injection, conditions are created for better homogenization of the fuel mixture, which ultimately enhances the dynamic range of the ignition of the working mixture in transient regimes of an engine, to improve the completeness of fuel combustion and hence reduce fuel consumption and significantly reduce the concentration of harmful emissions into the atmosphere.

Furthermore, it should be noted that magnetically treated fuel acquires high thermo-oxidative stability, which provides coating of the piston with smooth, highly durable and very thin film. This results in less friction, and in conjunction with significant reductions in soot formation (due to complete combustion) is considerably lessens wear and tear of the piston.

Structurally, magnetic modifier consists of a cover and a magnetic system and flow baffle inside. The cover as well as other parts and components of the magnetic modifier are made of either metal, stainless steel or phenolic, which has a high stability properties. It is resistant to water, acids, alkalis, mineral and petroleum oils as well as organic substances. Magnetic system of fuel modifier is made of hard magnetic material i.e. alloy of type α, consisting of different amounts of Fe, Ba, Ni, Al, Co, Cu.

Benefits of using a fuel modifier have repeatedly been proven on different types of vehicles in countries like United Arab Emirates, Argentina, England, Australia, India, Indonesia and Pakistan. Some of the results of these tests are presented in the table below and official documents.

Estimation of the concentration of gas components in the composition of car exhaust gases is performed by means of gas analyzers, available at service stations. It can also be done using a laser path measuring CO concentration device, if measuring only concentration of carbon monoxide is required.

Efficiency evaluation of magnetic fuel modifier:

1. Perform the measurement of concentration of the gas components prior to installation of the modifier on engine speed corresponding to the idling and exceeding it by 3-4 times. In each mode, perform at least 5 measurements and calculate the average.

2. The device should be fixed directly before the carburetor or injector or, if it is not possible, in any place on the fuel-line which carries fuel from the tank to the engine/carburetor.

3. After the operation of the vehicle under normal conditions for 5-7 days, but subject to mileage of at least 250 km, measure the concentration of gas components, as specified in point 1, and compare readings before and after installation to evaluate its performance.

Magnetic Treatment of Irrigation Source Water Supplies

All existing water reservoirs can be divided into several categories:

1. Natural water

Located away from industrial and residential areas and water free from industrial and waste pollutants.

Natural water can be easily cleaned using magnetic technology, even water with many inflowing sources, as long as it is not sewage waters. .

Silt or sediments of such lakes and rivers are of mainly mineral origin (sand, clay, etc.) and would not affect the process.

2. Water close to industrial production

Such waters will have a high content of different chemical components that require oxidation. This is called a chemical oxygen intake. Magnetic treatment of such waters provides excellent results, given that each point of inflow is equipped with magnetic systems. Also great results can be achieved at the initial stages of waste production, i.e. a factory producing waste installs devices at its production. Whatever the method, all water requires constant magnetic aeration. This can be achieved using magnetic fountains or coastal circulating pumps. Large bodies of water would require the use of a magnetic boat. A magnetic system 'Pulsar' is successfully used in flow channels and rivers.

After magnetic treatment, silt becomes less toxic than in non-treated waters.

3. Water close to residential areas or areas close to food industry production

Such waters create the most challenge. Sediments or silt are mainly of organic base, i.e. leftover food waste of dairy and meat production , dishwashing water, sewage discharges and so on. Such sediment is extremely dangerous as it takes several months and sometimes years for a fermentation process to take place. Which results in a constant process of decay within the sediment, causing bad smell and dark water color. At times such water may appear clear but it is only an optical illusion. This water is extremely dangerous for humans and animals.

The first indication that the water has a high level of organic matter, is a high level BOD 5 -biological oxygen demand. This is an indicator of water pollution by organic compounds, measured by the amount of oxygen consumed over a time period of 5 days (BOD5) under aerobic conditions in the oxidation of pollutants, contained in the unit volume of water. Typically, within 5 days under normal conditions, oxidation of up to 70% of easily oxidizable organic substances occurs. Whereas a complete oxidation of organic substances (BOD or BOD20) is achieved within 20 days.

According to GOST 17.1.3.03-77, BOD should not exceed 3 mg O2 / l in centralized drinking water supply and in fish-farming reservoirs.

When values exceed the permissible limits, then a continuous running of magnetic aerators is needed in such waters.

4. Water containing hydrogen sulfide.

Hydrogen sulfide (H2S) - a gas created as a result of rotting vegetation. It may be present in the water in deep wells and in surface waters. Hydrogen sulfide is the cause of unpleasant taste and odor (smell of 'rotten eggs'). At high concentrations it becomes poisonous, flammable and leads to corrosion of most metals. It is sometimes referred to as 'sulfur water'.

Signs of H2S presence:

• Unpleasant smell
• Colorless beverage (e.g. tea)
• Distorted taste of food
• Yellow or black coating on plumbing and laundry

Concentration of hydrogen sulfide is usually measured in mg / l. Gas may be present in hot and cold waters. The smell becomes noticeable even at a concentration of 0.5 mg / l. Typically, the concentration of dissolved H2S does not exceed 10 mg / l, but sometimes can reach up to 50 mg / l or higher.

Permissible concentration of hydrogen sulfide

There are 3 concentration levels:
Level 1 - The smell cannot be easily detected
Level 2 - Smell can be detected when water flows from a tap
Level 3 - Smell is strong even when tap is closed

Smell of hydrogen sulfide is less noticeable at pH level of 8.0 In some areas smell of hydrogen sulfide occurs is a seasonal occurance and is mostly common in spring and autumn.

One method of getting rid of hydrogen sulphide is to use Aeration columns. Also generally the smell still persists inside the columns even after treatment. Water treated using this method is often unsuitable for cooking.

Installation of magnetic devices in front of Aeration columns, followed by de-gasation inside the expansion tank and filtration, produces very good results. Such water has almost no smell and is suitable for cooking and watering plants.

Magnetic treatment of surface waters: rivers, canals, lakes, ponds, sea lagoons

Aim:
To achieve government compliant levels of suspended solids, color, odor, dissolved oxygen, biochemical oxygen demand.

Positive effects of magnetic treatment:

- renewal of natural biological processes
- improvement of water biosphere
- elimination of bad odours and Mosquito infestations

- improves the fish habitat and their development
- improves ecology in the surrounding area for insects, birds and plant life

Technical methods of magnetic treatment

- Use of natural flow
- Use of artificial water circulation - fountains, circulating pump stations, etc.
- Installation of magnetic systems on water transport, i.e. boat

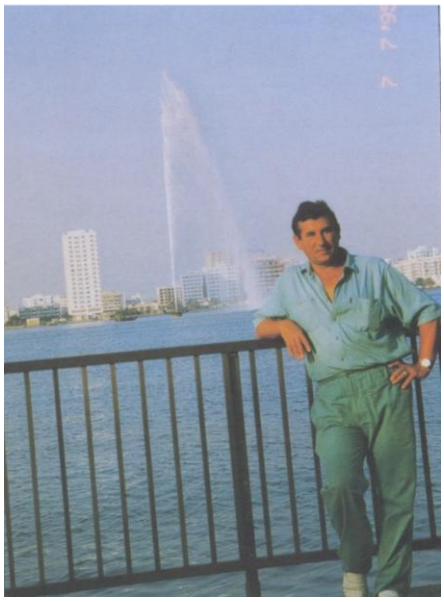
Some practical examples

Magnetic boat at a sea lagoon in Dubai, UAE





Magnetic boat- treatment of Zabeel municipality Lake Dubai



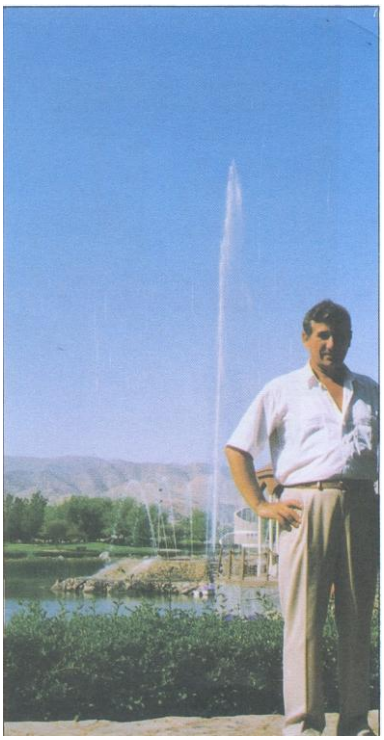
First in the world magnetic fountain, 1994, Sharjah, U.A.E.



Magnetic system used for fountain installation in Sharjah, 1994. After installation, fountain height increased by 30 meters. Height prior to installation was 82 meters, after installation- 116 meters.

Note to engineers:

Installation of magnetic devices on pumping equipment makes pumps more efficient and increases pipeline capacity by average of 30%. To obtain a stable result, magnetic devices are installed on a pipeline in front of the pump and immediately after the pump.



Magnetic fountain, Oman, Muscat



Magnetic fountain, Emirates Golf Club Dubai



Installation of magnetic devices onto a fountain, Dubai



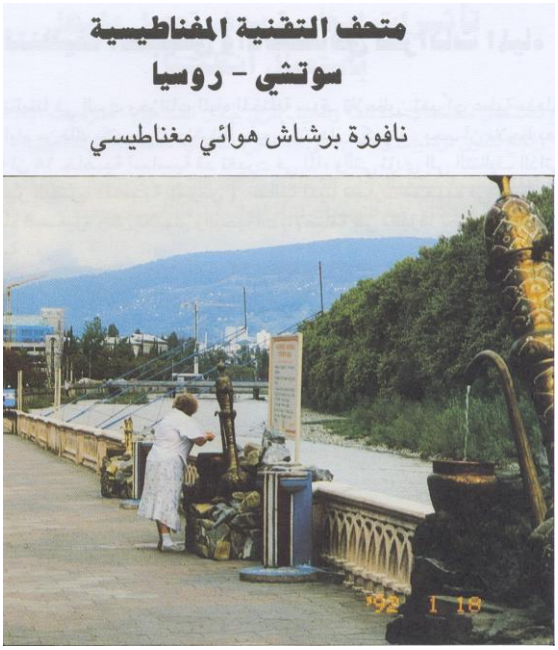
Magnetic fountain at work, Dubai



Magnetic fountain in golf club, Oman



Magnetic fountain in Xanoi, Vietnam



Magnetic drinking water fountains on the river bank of Sochi River, Sochi, Russia



Installation of a hydro- magnetic system on the river significantly improved water transparency and attracted a lot of fish towards the system.
At a distance of 0.5 km from the mouth of the river, water samples were taken before and after the installation of magnetic devices. Water subjected to magnetic treatment was a lot different from water prior to treatment. For example:

- Dramatically reduced bacterial contamination index (23,660 to 730, well below average values).
- Content of suspended substances decreased from 13.5 mg / l to 6.3 mg /l.

Man- made lake at the Emirates Golf Club, Dubai, UAE
The lake uses TSE water. As a result, its water was dark, had significant algae formation and had a sharp unpleasant smell, which caused complaints from golfers and local residents.

After installation, algae problem had reduced and unpleasant smell disappeared. Today the lake has a rich ecosystem with plenty of small fish in the water attracting many different bird species around the lake.

Sea lagoon (Muscat, Oman)
The fountain had been installed inside a lagoon, located on the territory of a private palace in the Sultanate of Oman. Prior to installation there were concerns over murky water, bad smell, low visibility of less than 15cm and lack of fish.

The fountain was equipped with a magnetic system. This had transformational effect on the lagoon- water became clear, visibility increased to 1.5 m, bad smell eliminated and fish numbers have significantly increased.

Pond with ornamental fish (Sharjah, UAE)

Pond is equipped with a reverse water system and filter units, ultraviolet processing system and an artificial waterfall. However, water remained cloudy, had a bad smell and high fish mortality.

A special small fountain equipped with magnetic system was specifically constructed. This had resulted in an increased transparency of the water, significant decreased in fish mortality rates. Water became suitable for animals to drink.

Magnetic treatment of wastewater: treatment plants, reservoirs and other technical facilities.

Aim:
To significantly accelerate water purification processes at all stages, including fermentation of silt or decreasing volume of chemical reagents.

Magnetic treatment of wastewater at various stages of technological process enables to:

- intensify clarification processes
- reduce formation time of flakes and coagulation of the suspended solids
- Intensify purification due to the finer weighed particles being more easily detected by filters
- decrease corrosive activity of wastewaters
- significantly reduce fermentation time of organic material
- increase the level of sediment density
- dramatically reduce chemical usage
- increase levels of extraction of dissolved hydrogen sulfide from water
- significantly reduce pathogenic bacteria
- increase efficiency of treatment plant

Some examples of practical use

Wastewater Treatment Plant (Dubai, UAE)
1. Silt site
Magnetic treatment was carried out on the following:

- Waste water at the inlet of the primary settling tank (up to fermenters)
- Water for the preparation of flocculant solution and the solution flocculant

Effect of magnetic treatment:

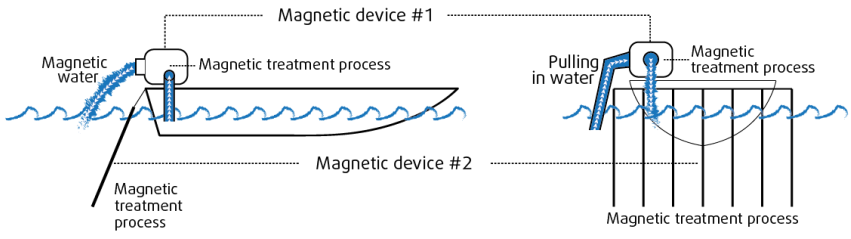
- Volume of silt extracted from the primary settler (up to fermenters), increased by 6-7%
- flocculant consumption decreased by 80-90%
- level of H2S increased by 80-90%
- biogas production in silt extracted from the fermenter, increasd by 29%
- Amount of silt extracted from fermenters increased by 29%
- fermentation time of silt decreased from 40-45 to 28-32 days

Waste recycling pools?
The volume of incoming wastewater significantly exceeds the capacity of treatment facilities, so part of the effluent after initial treatment enters waste pool drains. In these basins, part of wastewater is filtered through a special filter and soil at the bottom of the tank, and part evaporates.

Effect of magnetic treatment of wastewaters:

- The rate of recycling of waste increased by two times
- Birds around the pool area
- Transparency of water in the 'magnetic' pools is much higher than in non-magnetic ones
- Laboratory analysis of water before and after showed significant differences

Magnetic treatment of water reservoirs used in agriculture can also be done using magnetic boat:



Pic.: magnetic boat from side view

Pic.: magnetic boat from behind

Listed below are some practical examples of treatment of water reservoirs in Russia and other countries, including reports from different independent laboratories.

Results of magnetic treatment of a lake
(Russian Federation, Moscow area, Voskresnoe)

First water sample collected on 09.07.09 prior to magnetic treatment. Magnetic treatment lasted for 20 minutes. Second water sample collected after 24 hours from collection of the first sample.

Water analysis carried out by Analytical Centre of Control of Water Quality ('ROSA', Moscow, Russia).

No.	Index	Units	Norm	Value	
				Before magnetic treatment (09.07.2009)	After magnetic treatment (10.07.2009)
1	pH	-	6.5-6.8	6.4	7.5
2	Hardness	mg/l	0-7	1	1
3	Smell	points	0-2	3	2
4	Feculence	NTU	-	1.78	0.96
5	Colourness	degrees	-	47	34
6	Dry residue	mg/l	0-1000	90	87
7	Dissolved oxygen	mg/l	>4	5.25	7.03
8	БКП5	mg/l	0-2	5.7	2
9	ОМЧ 37	КОЕ/1ml	-	1300	590
10	General coliforms	КОЕ/100ml	0-500	32000	620

Results of magnetic treatment of a pond
(Russian Federation, Moscow, Yasnevo)





First water sample collected 09.07.09 prior to magnetic treatment. Magnetic treatment lasted 120 minutes. Second water sample collected after 24 hours from collection of the first sample.

Water analysis of physical-chemical parameters (1-6) was carried out by 'Mosvodostok' Laboratory (Moscow, Russia) and of microbiological parameters (7-10) by Analytical Centre of Control of Water Quality ('ROSA', Moscow, Russia).

No.	Index	Units	Norm	Value	
				Before magnetic treatment (07.07.2009)	After magnetic treatment (08.07.2009)
1	pH	-	6.5-6.8	6.4	7.5
2	Colour	-	-	green	transperent
3	Suspended solids	mg/in³	0-10.75	244	<3
4	Dissolved oxygen	mg/in³	>4	6.67	7.62
5	БКП5	mg/in³	0-2	6.32	2.89
6	Petroleum products	mg/mg³	0-0.1	0.13	0.03
7	Germs amount in sum(22°C)	КОЕ/1мл	-	3200	310
8	Germs amount in sum(37°C)	КОЕ/1ml	-	1400	190
9	General coliforms	КОЕ/100ml	0-500	300	210
10	Termal resistant coliforms	КОЕ/100ml	0-100	180	140

Magnetic treatment of natural waters, ground waters and waste waters.

Understanding water and its environment.

For water to naturally maintain its balance and purity it requires oxygenation, movement and circulation within fixed bodies of water such as lakes and ponds. Allow it to lay dormant and it will stagnate; algae takes hold, the turbidity deteriorates, infestations of mosquito larvae take hold and odours become repugnant.

Water is complex yet dynamic. It withstands being mistreated and polluted. It manifests itself in the most unlikely of locations and also survives in the harshest of environments.

The majority of the earths' fresh water is frozen in our icecaps or indeed hidden below ground.

Most of our water used within urban environments is recycled several times

Consequently, along with any recommendations of magnetic device installations, Magnetic Technologies equally review the natural mechanics of the water body and will identify deficiencies and make suggestions to enhance the overall water body environment, its infrastructure and its overall functionality.

Results: visible one week after the installation

A significant increase in the efficiency of industrial processes:

- accelerates flocculation, coagulation, sedimentation and filtration processes
- increases efficiency of extraction
- reduces corrosion processes
- reduces growth rates of mineral and biological sediment
- individuals and companies benefit from lower operating costs and lower energy consumption

Results of magnetic treatment on natural waters renewal of natural biological processes

- improvement of water biosphere
- elimination of bad odours
- increase in fish production as a result of lower death and disease rates
- improves ecology around the area

Use of wastewater for irrigation of plants

- intensify clarification processes (i.e. lighter in color)
- reduce formation times of flakes and coagulation of the suspended solids
- Intensify purification due to the finer weighed particles being more easily detected by filters
- decrease corrosive activity of wastewaters
- significantly reduce fermentation time of organic material increase the level

of sediment density
- dramatically reduce chemical usage, eliminating many chemical needs all together
- increase levels of extraction of dissolved hydrogen sulfide from water
- significantly reduce pathogenic bacteria
- increase efficiency of treatment plant

Algae growth

Algae influence the water quality of the pond, mainly by affecting the balance among dissolved oxygen, pH, carbon dioxide and nutrients. During photosynthesis, algae produce oxygen, remove nutrients and take up respired carbon dioxide from both the fish and the algae itself. In heavily stocked ponds, the water becomes supersaturated with carbon dioxide. High levels of carbon dioxide can quickly depress the pH of the water to levels below seven if the pond is not carefully maintained with proper alkalinity levels and adequate aeration for stripping. During active periods of photosynthesis (during daylight hours), algae can quickly strip the carbon dioxide out of the water and pH levels can rise above nine in a matter of hours. Fish which are not acclimated to such sharp shifts may initially show signs of stress and potentially die. At night, both algae and fish consume oxygen from and exhale carbon dioxide into the system. Algae compete with the fish for available oxygen in the water. A potentially serious impact of an algae bloom is the risk of an "algae crash" triggered by temperature or barometric pressure. When an algae bloom collapses, dead algae cells settle to the bottom of the pond adding to the decomposing sediment's oxygen demand. If the crash is severe, the pond's oxygen supply can be quickly depleted, endangering the fish, unless backup aeration is available. Additionally, as the dead algae cells rupture, they can release organic nitrogen and phosphorus back into the water adding to the system's nutrient load. The biological cycle starts again with bacteria converting the organic nutrients to inorganic elements. Which are then available to be recycled, and the algae bloom continues.

Magnetic application provides the necessary positive continuity within the eco system.

Common Micro-organisms in ponds

Bacteria is a large group of single celled organisms that are found in every corner of the earth, be it land, air or water. There are approximately 5×1030 bacteria on the earth that form a major part of the biomass. These are prokaryotes that lack a nucleus and membrane bound organelles. They come in different shapes and sizes.

Proteobacteria and Actinobacteria negative gram cells are mostly anaerobic and heterotrophic and contribute a lot to decomposition of waste suspended in the water and deposited in the sedimentary floor. Proteobacteria flourish in eutrophic ponds and include phototrophs, pathogens, and fecal bacterial indicators of contaminated water. They can be found suspended in all layers of the pond. Fecal indicator bacteria are bacteria used to assess the quality of a water source.

Protozoa commonly range from 10 to 52 micrometers, but can grow as large as 1 mm, and are seen easily by microscope. The largest protozoa known are the deep-

sea dwelling xenophyophores, which can grow up to 20 cm in diameter. They were considered formerly to be part of the protista family. Protozoa exist throughout aqueous environments and soil, occupying a range of trophic levels.

Magnetic treatment contributes to a healthy water environment for beneficial bacteria.

Insect infestation [especially mosquitoes]

General insects:

Ponds are housing grounds for myriads of insects like mayflies, water bugs, water scorpions, etc. Scores of insects enter into this world through ponds and some of them even live all their lives in ponds (adapted to living in water), whereas others live their larval and nymph stages in these ponds until and leave the pond on reaching adult stage. Pond insects feed on larvae of other insects found in the pond, decaying vegetation and algae. Each insect species is well-adapted to surviving in the aquatic environment, and the characteristics of each species is unique.

Mosquito larvae consume microorganisms and organic matter in water. Mosquitoes prefer stagnant water within which to lay their eggs. They most commonly infest ponds, marshes, swamps and other wetland habitats. Water that has been stagnant for three days is a prime habitat for mosquitoes. Hot, humid environments are most amenable to mosquito growth and survival. The Anopheles, Culex, Culiseta, Coquillettidia and Uranotaenia species breed in permanent bodies of water and can survive in polluted water as well as freshwater, acid water and brackish water swamps.

Elimination of mosquitos

Magnetizing water, especially within lakes, pond, water courses and TSE storage prevents the abundant larvae survival and transforms its necessary habitat, making it an unsuitable environment for the manifestation of the mosquito, but enhances the water for positive balance of insects such as mayflies. As a result, installation of magnetic systems saves thousands of dollars on pesticide use.

Odors and repugnant Smells

Odors are caused by the evaporation of a water surface or of moisture upon any surface. The evaporating moisture carries the small particles of the original substance that generate the smell. Algae and discarded pollutions and sewerage and chemicals are typical substances within amenity water features that cause smell. Stagnated waters and high saline solutions which kill the ecology creating decomposing plant and fish life also creates extreme smell.

Magnetic treatment of water gets rid of repugnant smells by eliminating dispersion of odor through evaporation from the water surface.

Benefits of a Good Ecological System

Plants in ponds play a vital role in pond ecosystems. Pond plants can be roughly divided into three main categories: submerged, emergent, and floating. Each group of these plants for ponds provides different general functions within their environment. Submerged plants are those that are completely underwater and they help add oxygen to the water, provide cover for a variety of small animals from invertebrates to small fish.

Eg. Hornwort.

Emergent plants are those which are rooted underwater and whose leaves and/or flowers break the surface of the water. This group provides food and cover for small fish, amphibians, birds and even small mammals. Eg. Grass, Cattails.

Floating plants are those which float freely on the surface of the water. This group of plants helps provide shade for the pond during warmer times of the year (helping regulate water temperature) and also can provide a source of food for waterfowl and fish species. Eg. Water lily, Duckweed.

Planting species from all three categories helps to create a sustainable pond ecosystem that works together to provide the most benefits for aquatic life. Besides aquatic life plants are helpful for birds as feeding ground.

RECOMMENDATIONS TO COMBAT "blooming" of water in open areas and pools

'Blooming' of water has a negative effect on its quality. Chemical, mechanical and biological methods are used to combat excessive development of phytoplankton in the open waters. All these methods are expensive and time consuming. In addition, the suppression of vital functions of blue-green algae using pneumatic aeration throughout the water, has no effect on other forms of phytoplankton, and in some cases even contributes to its growth. Gas composition of water plays a special role in the development of all types of plankton. Therefore, a universal method to significantly slow down the development of plankton is to degas water. A magnetic degassing device needs to be installed above the surface of the water, at the end of the pipeline.

When using chlorinated water, it needs to be processed through a system consisting of a degasser and a magnetic device. In that order. It is better to be place them in a single unit and use as a single device.

Benefits for fish in ecosystem

Fish are heterotrophic organisms consume autotrophic organisms and use the organic compounds in their bodies as energy sources and as raw materials to create their own biomass. Fish, besides giving a pleasant and lively look to the lakes, helps to keep the aquatic life under control by controlling the population of lower organisms as insects, phytoplankton and zooplankton. Small fish serve as food to higher fish organisms and birds.

Magnetized water creates a proliferation of Fish, creating an evenly oxygenated environment

Benefits for Amphibians:

- Amphibians like frogs, toads play a pivotal role in pond ecosystem as secondary consumers in many food chains. They fill a critical role both as predator and prey species.
- Tadpoles have significant impact in nutritional cycling. They are herbivorous to omnivorous and are the prey items for both invertebrates and vertebrates.
- Adult amphibians are the best biological pest controllers. Invertebrates and vertebrates also predate them. Because of their importance in ecosystem, decline or extinction of their population has significant impact on other organisms along with them.
- Amphibians are regarded as good ecological indicators. Due to high degree of sensitivity, either during tadpole stage or as adults, they respond to very slight change in the environment. Such responses have been used to indicate habitat fragmentation, ecosystem stress, impact of pesticides, and various anthropogenic activities.

Magnetized water provides a balanced and enhanced eco system for Amphibians.

Appendix B

Patents

All devices and methods and its applications are patented and are owned by Yury Tkachenko, scientific director and partner of Magnetic Technologies LLC. Manufacturing, using, selling or importing product or process is a patent infringement and is a prohibited act without permission from the patent holder.

1. ' Method of growing agricultural products'
2. ' Device for treatment of substances in magnetic fields'
3. 'Device for magnetic treatment of liquids'
4. 'Method of treatment of natural and sewage waters and its
5. designated device'

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O. Sadeghipour, P. Aghaei
Department of Agronomy, Shahre-Rey Branch, Islamic Azad University, Tehran, Iran
Article published on January 21, 2013

2. Effect of irrigation with magnetically treated water on faba bean growth and composition
Accepted 31 January, 2013

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Appendix C

Co Authors

I would like to thank my partner and colleagues at Magnetic Technologies for their continuous support in writing this book.

Junaid Khoory



Mr.Junaid Khoory is the Managing Director of Khoory Hill, one of the leading building and contracting companies of the U.A.E. Mr.Khoory is a graduate in Business Administration and Accountancy, Al Ain University.

He is the second generation descendant of the enterprising and illustrious Khoory family - a family which first established business in the Gulf in the late 1920's with its flagship M.A.H.Y. Khoory Company.
Throughout the years the Khoory family have been involved in businesses ranging from textiles and foodstuffs to recycling waste paper and have been managing their ventures successfully in Oman, Bahrain, Pakistan and the U.A.E.

The Khoory Group of companies have amongst others the following agencies:

Blackstone Lister & HSPP of M Sidley Group of the UK
Grundoff Pumps from Denmark
GMC and Oldsmobile Vehicles

Besides Al Khoory Engineering was established in 1984 to manufacture and assemble pipes, pumps, desalination plants, etc. The company was inaugurated by the then Prime Minister of Denmark.

In 1988 Union Paper Mills, a plant set up to recycle waste paper, was established in the United Arab Emirates with the investment of AED 50 mln. The mill was the first of its kind in the country and commenced production in August 1988.

Oleksandr Sokolov



Postgraduate (1988) Kharkov Military Institute, faculty “Automated Control Systems”.
Engineer (1989 – 1992) Kharkov Military Institute, sub-faculty “Applied Mathematics”.
Researcher, Senior Researcher (1992 – 1999) of Kharkov Military University (Ukraine), Scientific Center, Department of Systems Analysis.
Senior Researcher (1999 – 2000) of Research & Technology Institute ”Transcription, Translation and Replication” (Kharkov, Ukraine).
Scientific Consultant (2000 – 2013) of Magnetic Technologies LLC (Dubai, UAE).
Senior Manager – Technology & Analytics of Applied Energetics Technologies LLC (Abu Dhabi, UAE).
Publications: 28 scientific works, 1 invention.

Garry de la Pomerai

International Project Development



Magnetic Technologies L.L.C. U.A.E.

Since 1998 working within Disaster Risk Reduction, from 2005 as an independent consultant affiliated to United Nations Agencies UNISDR & UNESCO, addressing Geological and Meteorological Risks and Human and Built Environment vulnerability; identifying social and technological solutions to improving preparedness, resilience, recovery and sustainability for seismic, flood, tsunami and drought events. Since 2011 joining Magnetic Technologies in developing their application expansion into the Water Resource sector, including project management of water treatment, lakes enhancement and agricultural irrigation applications. "Understanding water resource management will be the critical factor for humanity's future survival. The application of Magnetic Technologies will make a significant contribution to achieving global enhancement of water resource sustainability".

Appendix D

Reports, Abstratcs & Conclusions

The 3rd International Conference on Water Resources and Arid Environments (2008) and the 1st Arab Water Forum

Application of Magnetic Technologies in Correcting Under Ground Brackish Water for Irrigation in the Arid and Semi-Arid Ecosystem

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Abstract

While water on a global scale is plentiful, 97% is saline and 2.5 % is trapped in glaciers and ice, leaving only 0.75 % available in fresh water aquifers, rivers and lakes. Most of this fresh water (69%) is used for agricultural production, 23% for industrial purposes and 8 % for domestic. Under arid and semi-arid region water are scarce resource and therefore, one of the greatest challenges facing agriculture is how to sustainable management natural resources.

Approximately two third of Arab Countries suffer from severe environment of arid and semi-arid zones affected by rare of fresh water and salt saline soil and under ground water.

Saline soil can not be reclaimed by any chemicals, conditioners, or fertilizers. Reclamation of these types of soils only through application enough high quality water to leach the soil thoroughly. The water applied should be low in sodium but must be fairly saline. The prospect of using magnetic technologies in agriculture is not new concept. Recently, magnetizing saline irrigation water through a proper magnetic field has been introduced as an effective mean for soil desalination. The experiment of Oleshko and Takatchenko, highlight the using cheap magnetic energy to improve the properties of soil and water quality. Moreover, the result of many experiments stated that magnetized water applied to salty soil breaks down the salt crystals twice as fast as un-magnetized water allowing the salt to be leached from soil. Under Egyptian condition, the application of magnetic technologies is new concept. Therefore, the present work were carried out at South Sinai Governorate ,over three years experiments, in saline sandy soil irrigated with under ground brackish water .The main object of the study is to evaluate the effectiveness of magnetizing under ground brackish water to increase the applicability of water for irrigation, salts accumulation in soil, mobility of nutrient elements in root zone , which are favorable to plant growth and its interact on yield and yield component characters of the tested crops (wheat, Barely and tritical).A magnetic unit for water through magnetic field compared with untreated water. Obtained results indicated that magnetized water induced changes in mobility of nutrient elements in root zone differed greatly from element to another according to element magnetic susceptibility .Magnetized irrigation water has also induced changes in solubility of some soil components such as CaCO3 and gypsum. Magnetized irrigation water was also effect on seed germination, full seed germination of 100 % for wheat, barley and tritical after 6 days from sowing compared to a rate of 83, 86 and 86 % after 9

days from sowing for untreated one, respectively. Results also manifested that the water traveling distance must be consider. The process is lengthy and there is a cost but the cost of not beating this problem is infinity greater.

Conclusion

It can be concluded that magnetic technologies can provide better soil water plant relation and is thus worth further consideration. The process is lengthy and there is a cost but the cost of not beating this problem is infinity greater.

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Full Length Research Paper

Changes in germination behavior of wheat seeds exposed to magnetic field and magnetically structured water

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Accepted 23 January, 2012

To study the invigoration impact of magnetized seed and water on germination, wheat seeds with low viability (45%) were subjected to magnetization treatments. Seed and water was passed through specifically designed magnetic funnels. Comparison was made between treatments and control for seed germination (%), shoot and root length (cm) and their fresh and dry weight (g). Seed germination index (SGI) was also calculated and compared. Magnetized water (structured water) was more invigorative to seed germination with linearity to number of passing as compared to seed magnetization. A 13.3% increase in germination was observed as compared to control using magnetized water, whereas increase in germination was insignificant with the seed magnetization. The interaction exhibited no effect on germination. It was concluded that wheat seeds with low vigor can be invigorated with the use of magnetized water; whereas, the potential to use magnetized seed remain to be extensively studied on larger groups of crops/samples.

Conclusion

Wheat seeds with low vigor were subjected to either magnetized water and seed magnetization or both. A definite influence of magnetization was noted on the structure of water and physiological properties of seeds when exposed.

However, the structural water affects wheat seed germination positively and proportionally to the number of passing through the device. Whereas in case of seed exposed to magnetization, the response is variable and the interaction more complex. This study therefore recommends the use of water magnetization for the enhancement of wheat seeds germination.

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Full Length Research Paper

Effects of magnetically treated water on water status, chlorophyll pigments and some elements content of Jojoba (Simmondsia chinensis L.) at different growth stages

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In this study, the biological effects of magnetically treated water (MTW) under different water regimes (70, 50, and 30% SWHC) on water relations, photosynthetic pigments and nutrient contents of Jojoba plants has been studied under laboratory conditions. The results indicate that the magnetically treated water especially at 50 and 30% treatments has an enhancing effect on the photosynthetic pigments compared to the control. Also water use efficiency (WUE) (in term of biomass produced to amount of water consumed), was increased in the plants irrigated with MTW as compared to the control treatment, while relative water content (RWC) was increased with MTW under 30% soil water holding capacity (SWHC) to the highest levels only after both 6 and 8 months. The essential elements except sodium were increased significantly (P=0.01) in plants irrigated with MTW compared to their control. Thus, the present results have shown that irrigation with MTW can be considered as one of the most valuable modern technologies that can assist in saving irrigation water and reducing salt accumulation in plants.

CONCLUSION

The present findings have shown that irrigation with MTW can be considered as one of t he most valuable modern technologies that can assist in saving irrigation water and reducing salt accumulation in plants. However, the potential of magnetically treated water for crop production needs to be studied under field conditions to demonstrate its effects on yield production.

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Irrigation with magnetized water enhances growth, chemical constituent and yield of chickpea (*Cicer arietinum* L.).

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ABSTRACT

Magnetic fields are known to induce biochemical changes and could be used as a stimulator for growth related reactions. Two pot experiments were conducted during 2008/09 and 2009/2010 seasons at green hose of National Research Centre, Egypt to study the impact of magnetized water on growth, some chemical constituents (chlorophyll a and chlorophyll b, carotenoids, total pigment, total indole, total phenol contents and protein profile of plant) and productivity of chickpea plants. Chickpea seeds were irrigated with water passed through magnetic device (U050 mg, 0.5 inch, output 4-6 m^3/hr, production by Magnetic Technologies L.C.C., Russia, branch United Arab Emirates). Results indicated that, irrigation with magnetized water induced positive significant effect on all studied parameters. The percent of increase in seed, straw and biological yields per plant were 39.64, 41.03 and 39.85%, respectively compared with tap water (average over both seasons). Magnetic water treatment could be used to enhance growth, chemical constituents and productivity of chickpea under green house condition.
Keywords: Chickpea, magnetized water, growth, chemical constitute, yield.

CONCLUSION:

Magnetic water is considered one of several physical factors affects plant growth and its development. Results obtained in Table (1) showed that chickpea plants which irrigated with magnetic water grew taller and heavier than those irrigated with tap water. The stimulatory effect of the application of magnetic water on the growth parameters reported in this study may be attributed to the increase in photosynthetic pigments, endogenous promoters (IAA) (Table 2); increase protein biosynthesis (Table 3). In this connection, Fomicheva *et al.*, (1992 a & b) and Belyavskaya (2001) reported that magnetic water significantly induces cell metabolism and mitosis meristematic cells of pea, lentil and flax. Moreover, the formation of new protein bands in plants treated with magnetic water may be responsible for the stimulation of all growth, and promoters in treated plants. In this respect, Celik *et al.* (2008) found that the increase in the percentage of plant regeneration is due to the effect of magnetic field on cell division and protein synthesis in paulownia node cultures. Shabrangi and Majd (2009) concluded that, biomass increasing needs metabolic changes particularly increasing protein biosynthesis. Our results are in agreement with those obtained by other researchers; Hilal and Hilal (2000) they reported that magnetized water has more tripled seedling emergence of wheat than tap water. Reina *et al.* (2002) found significance increase in the rate of water absorption accompanied with an increase in total mass of lettuce with the increase of magnetic force. Moreover, Nasher (2008) found that chick pea plants irrigated with magnetized water were taller than plants irrigated with tap water

Significant increases in pigment fractions were recorded in chickpea plants irrigated with magnetized water compared to control treatment. These results may be due to the effect of magnetic field on alteration the key of cellular processes such as gene transcription which play an important role in altering cellular processes. In this respect Tian *et al.* (1991) and Atak *et al.* (2000 and 2003) who found an increase in chlorophyll content specifically appeared after exposure to a magnetic field for a short time. Moreover, Atak *et al.* (2003) suggested that, increase all photosynthetic pigment through the increase in cytokinin synthesis which induced by MF. They also added cytokinin play an important role on chloroplast development, shoot formation, axillary bud growth, and induction of number of genes involved in chloroplast development nutrient metabolism. It also may be due to the increase in growth promoters (IAA) (Table 2). Similar results were observed on rice and chick-pea when irrigated with magnetic water (Tian *et al.* 1991 and Nasher 2008). As well as the improvement of photosynthetic pigments were recorded in *Paulowria species* (Atak *et al* 2000), sunflower (Oldocay, 2002), soy bean (Atak *et al* 2003) when seeds or explants exposed to magnetic field (3.8 – 4.8 mt) for a short time.

Our results also showed the promotive effect of magnetic water treatment on total phenols and total

indole. This improvement may be attributed to the role of MT in changing the characteristic of cell membrane, effecting the cell reproduction and causing some changes in cell metabolism (Goodman *et al*., 1995 and Atak *et al*., 2003).

The formation of new protein bands in plants treated with magnetic water was accompanied with increasing growth promoters (IAA) (Table 3). In this respect, Kuba *et al*., (2000) found that IAA effect on DNA replication. Moreover, Celik *et al*. (2008) and Shabrangi and Majd (2009) reported that magnetic field is known as an environmental factor which affects on gene expression. Therefore, by augmentation of biological reactions like protein synthesis

Chickpea yield and its components were increased significantly under magnetic irrigation. These results are logical to improvement growth parameters (Table-1) and growth promoters (IAA) and photosynthetic pigments (Table 2). The remarkable improvement induced by the magnetic treatment was consistent with the results of other studies on other crops like cereal, sunflower, flax, pea, wheat, pepper, tomato, soybean, potato and sugar beet. In these studies the crop yield were increased (Pittman,1972; Gubbels,1982; Vakharia *et al*., 1991; Pietruszowski, 1993; Namba *et al*., 1995; Atak *et al*., 1997; Özalpan *et al*., 1999; Yurttafl *et al*., 1999; Pietruszewski (1999a &b) Reina *et al*., 2001; Oldaçay, 2002,), Takac *et al*. (2002), Crnobarac *et al*. (2002) and Marinkovic *et al*. (2002).

It could be concluded from this study that, chick pea irrigation with magnetized water could effectively increase growth parameters, yield and some chemical constituents.

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Response of Growth, Yield, Yield Components and Some Chemical Constituents of Flax for Irrigation with Magnetized and Tap Water

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Abstract: The water treated by the magnetic field or pass through a magnetic device called magnetized water. Two pot experiments were carried out at the greenhouse of Agronomy Department, National Research Centre, Dokki, Giza, Egypt during two successive winter growth seasons (2008/09 and 2009/2010) to study the effect of irrigation with magnetized water on growth, yield, yield components and some chemical constituents of flax compared with tap water. According to average of both seasons results, flax plants which irrigated with magnetic water exhibited marked increases in the most of vegetative growth, chemical constitute i.e. photosynthetic pigments (chlorophyll a, b and carotenoids), total phenols and total indole over the control plants. The magnetized water treatment exhibited an increase in the number of protein bands as compared to the control. Moreover, the magnetized water treatment increased yield and yield component traits at harvest. The increases in seed yield/plant reached to 9.10% compared with tap water treatment. It appears that the preliminary study on utilization of magnetized water can led to improve flax yield under green house condition.

CONCLUSION

Magnetic water treatment has stimulatory effects of growth, photosynthetic pigment, growth promoters and protein synthesis consequently increased yield components of flax plant. So we could pay more attention to this new cheep and safe tool in increasing the production of our economic crops.

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Magnetic water application for improving wheat (*Triticum aestivum* L.) crop production

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ABSTRACT

The technology of magnetic water has widely studied and adopted in field of agriculture in many countries (Australia, USA, China and Japan), but in Egypt available review on the application of magnetize water in agriculture is very limited. Therefore, the present work was carried out to study the response of growth, yield, yield components and some chemical constitute of wheat for irrigation with magnetized and tap water under green house condition during 2008/09 and 2009/2010 winter seasons. Based on results of our experiment plants irrigated with magnetic water exhibited marked increases in the most of vegetative growth, chemical constitute i.e. photosynthetic pigments (chlorophyll a, chlorophyll b and carotenoids), total phenols and total indole over the control plants. Also, the magnetized water treatment exhibited an increase in the number of protein bands as compared to the control. Moreover, the magnetized water treatment increased yield and yield component at harvest. On average, the increases in grain, straw and biological yield tiller $^{-1}$ reached to 31.33, 24.56 and 28.24%, respectively compared with tap water treatment. It appears that the preliminary study on utilization of magnetized water can led to improve quantity of wheat crop. So, using magnetic water treatment could be a promising technique for agricultural improvements but extensive research is required on different crops.

CONCLUSION

In this study, the results showed the positive effects of magnetic water on growth, photosynthetic pigment, total indole, total phenol and yield of wheat plants compared to control treatment.

The stimulatory effect of magnetic water on the growth data reported in this study may be due to the increase in photosynthetic pigments, endogenous promoters (IAA) (Table 2); increase protein biosynthesis (Table 3). In this connection, Fomicheva *et al.*, (1992 a & b) and Belyavskaya (2001) reported that magnetic water significantly induces cell metabolism and mitosis meristematic cells of pea, lentil and flax. Also, Aladjadjiyan (2002) showed that exposure of zea mays seeds to magnetic water has a favorable effect on the development of shoots in the early stage. Atak *et al.* (2003) and Aycih and Alikamanoglu (2005) concluded that magnetic field increased the shoot and root regeneration rate and their fresh weight in soybean and paulownia organ cultures. Moreover, Celik *et al.* (2008) and Nasher (2008) concluded that, magnetized water increased growth and consider an important factor for inducing plant growth. In earlier study Phirke *et al.* (1996) reported that the mechanisms of magnetic field may be including biochemical changes or altered enzyme activities.

Photosynthetic pigments content in fresh wheat at 55 DAS have shown a significant increase in response to irrigation with magnetic water. This increment may be attributed to Increasing ions mobility and ions uptake improved under MF which leads to a better photo stimulation in wheat plants (Pietruszewski, 1999). Moreover, magnetic field has the ability to change water properties, thus magnetized water increased rice chlorophyll content (Tian *et al.*, 1989) Several studies reported Similar results for different plants; (Rochalska M. 2005) found that MF treatment increased the chlorophyll content in sugar beet (*Beta vulgaris* L.) leaves and content of chlorophyll a, b and carotenoids in potato (*Solanum tuberosum* L.) (Rakosy-Tican *et al.*, 2005). Additionally, studies by Atak *et al.* (2003 and 2007) involving MF impact on soybean (*Glycine max* L.) confirmed that MF significantly increased chlorophyll a, chlorophyll b and total chlorophyll contents.

The significant increases in photosynthetic pigment contents were accompanied with significant increase in total indole content (Table 2). In this regard, Atak *et al.* (2003) summarized that; chloroplast rate was increased at the explants exposed to MF in accordance with control. As a consequence, the increase in cytokinin and auxin synthesis may be induced by magnetic field.

The increment in total phenol content in wheat plants treated with magnetic water reached to 33.59% compared to control treatment, this increase may be attributed to the role of magnetic treatment in changing the characteristic of cell membrane, effecting the cell reproduction and causing some changes in cell metabolism (Goodman *et al.*, 1995 and Atak *et al.*, 2003).

Auxins have been used in order to induce the rooting in the produced shoots. They also increased the growth of shoot tip explants. Cell division has been arranged the interaction of auxin and cytokinins together. Each of these has been effecting the different phases of the cell cycle. While auxins effect

on DNA replication, cytokinin are effective on some events causing mitosis (Kuba *et al.*, 2000).
Also, Atak *et al.* (2003) summarized that, shoot regeneration and chloroplast rate were increased at the explants exposed to MF and root formation rate and fresh weight were also increased at the explants exposed to MF in accordance with control. As a consequence, the increase in cytokinin and auxin synthesis may be induced by magnetic field.

The formation of new protein bands in plants treated with magnetic water was accompanied with increasing growth promoters (IAA) in treated plants (Table 3). In this respect, Kuba *et al.*, (2000) found that IAA effect on DNA replication. Moreover, Celik *et al.* (2008) and Shabrangi and Majd (2009) reported that magnetic field is known as an environmental factor which affects on gene expression. Therefore, by augmentation of biological reactions like protein synthesis.

Regarding to yield and yield components, the results clear that all yield parameters increased significantly when irrigation occurred using magnetic water. These results are the logical to improvement growth parameters (table1), growth promoters (Table 2) and protein synthesis (Table 3). The stimulatory effect of magnetic water on yield and yield components reported in this study is in agreement with that obtained by other researchers. Tian *et al.* (1991) indicated that, magnetic water increased yield of rice by 13-23%. This increase was accompanied the stimulation effect of MW on leaf chlorophyll content. Kordas (2002) found that, the exposure of green tops and root systems of wheat plant to magnetic field brought about increased quantity of coarse grain by 10.6% and 6.3%, respectively. De Souza *et al.* (2006) showed that magnetic treatments on tomato increased significantly the mean fruit weight; the fruit yield per plant; the fruit yield per area and the equatorial diameter of fruits in comparison with the controls.

Exposure of plants to MW is highly effective in enhancing growth characteristics. This observation suggests that there may be resonance-like phenomena which increase the internal energy of the seed that occurs. Therefore, it may be possible to get higher yield (Vashisth and Nagarajan, 2008 and Shabrangi and Majd, 2009) on chickpea and lentil respectively.

In summary, growth parameter and yield components of wheat plants is concomitantly increased when wheat plants irrigated with magnetic water with increasing photosynthetic pigment; endogenous total indole; total phenol and protein synthesis.

We hope to attract the attention of scientific community to study this important phenomenon. Collaboration with physicists; biologists and physiologists are necessary in order to understand the mechanism of magnetic water action. Generally, using magnetic water treatment could be a promising technique for agricultural improvements but extensive research is required on different crops.

Bioelectromagnetics 32:58–65 (2011)

Magnetic Treatment of Irrigation Water and Snow Pea and Chickpea Seeds Enhances Early Growth and Nutrient Contents of Seedlings

Harsharn S. Grewal and Basant L. Maheshwari*

School of Natural Sciences, University of Western Sydney, Penrith South DC, NSW, Australia

The effects of magnetic treatment of irrigation water and snow pea (*Pisum sativum* L var. macrocarpon) and Kabuli chickpea (*Cicer arietinum* L) seeds on the emergence, early growth and nutrient contents of seedlings were investigated under glasshouse conditions. The treatments included (i) magnetic treatment of irrigation water (MTW), (ii) magnetic treatment of seeds (MTS), (iii) magnetic treatment of irrigation water and seeds (MTWS) and (iv) no magnetic treatment of irrigation water or seeds as control treatment. A magnetic treatment device with two permanent magnets (magnetic induction: 3.5–136 mT) was used for the above treatments. Seeds were sown in washed sand and seedlings were harvested at 20 days. The results showed that MTW led to a significant ($P < 0.05$) increase in emergence rate index (ERI; 42% for snow pea and 51% for chickpea), shoot dry weight (25% for snow pea and 20% for chickpea) and contents of N, K, Ca, Mg, S, Na, Zn, Fe and Mn in both seedling varieties compared to control seedlings. Likewise, there were significant increases in ERI (33% for snow peas and 37% for chickpea), shoot dry weight (11% for snow pea and 4% for chickpea) and some nutrients of snow pea and chickpea seedlings with MTS in comparison with the controls. The results of this study suggest that both MTW and MTS have the potential to improve the early seedling growth and nutrient contents of seedlings. Bioelectromagnetics 32:58–65, 2011. © 2010 Wiley-Liss, Inc.

CONCLUSION

The treatment of irrigation water and seeds with non-uniform magnetic fields for a brief exposure significantly increased seedling ERI and shoot dry weight in both snow peas and chickpeas. The MTW resulted in a significant ($P < 0.05$) increase in N, K, Ca, Mg, S, Zn, Fe and Mn contents in snow pea and chickpeas seedling. Similarly, the MTS also resulted in an increase in N, Ca, S, Zn, Fe and Mn contents for snow peas seedlings only. The MTW was more effective than the MTS for seedling emergence and seedling growth. There was no additional advantage gained by treating both irrigation water and seeds for any of the attributes of snow pea and chickpea seedlings, except for a significant increase in seedling emergence percentage of snow peas when compared with the control. The obtained effects are mainly attributable to the application of a high gradient magnetic field to both seeds and water because the exposure time was very brief.

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Magntic Water Technology, a Novel Tool to Increase Growth, Yield and Chemical Constituents of Lentil (*Lens esculenta*) under Greenhouse Condition

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Abstract: Two pot experiments were carried out in a greenhouse of Agronomy Department, National Research Centre, Giza, Egypt during 2008/09 and 2009/2010 winter seasons to comparison between irrigation with magnetize and tap water on growth, yield, yield components and chemical constituents of lentil (*lens esculenta* Moench). Irrigation lentil plant with magnetized water significantly improvement the most above mentioned parameter compared with tap water. On average of both seasons, the percent of increment reached to 21.75, 18.18, 15.05 and 1.37% for plant height, fresh and dry weight per plant and water contents (%), respectively and was 13.58, 44.67, 21.4, 2.7, 21.4, 20 and 148.19% for Chl a, Chl. b, Chl. a+b, carotenoids, total pigment, total phenols and total indole, respectively. Also the 7 new protein bands formed in the plants that irrigated with magnetized water compared with tap water. The improvement in growth and chemical constituent parameters reflected in increasing seed, straw and biological yield per plant by 24.98, 26.69 and 25.82%, respectively over the control treatment. It appears that utilization of magnetized water technology me be considered a promising technique to improving lentil yield productivity.

CONCLUSION

Regarding to the effect of magnetic water on lentil yield and its components, data in Table 3 showed the promotive effect of this tool in increasing all yield components such as number of branches, pods and seeds per plant and weight of pods, seeds, straw and biological yields per plant and 100-seed weight significantly in 2008/09 and 2009/2010 seasons. An average of both seasons the percent of increase reached to 17.98, 25.48, 29.08, 17.03, 17.88, 24.98, 26.69, 25.82 and 6.24 % for above mentioned parameters, respectively. These results reflect the stimulatory role of magnetic water on increasing growth criteria (Table 1), photosynthetic pigment and growth promoters (IAA and total phenols) (Table 2) and the increase in protein biosynthesis (Table 3). In this connection, Tian *et al.* [21] indicated that, MW increased yield of rice by 13.23%. This was accompanied with the stimulation effect of magnetic water on leaf chlorophyll content. Kordas [24] found that, the exposure of green tops and root systems of wheat plant to MF increased quantity of coarse grain by 10.6 and 6.3%, respectively. Moreover, De Souza *et al.* [25] showed that, MT on tomato increased significantly the mean fruit weight, the fruit yield/plant, the fruit yield per area and the equatorial diameter of fruits in comparison with the controls. Also, Çelik *et al.* [11] concluded that, MF was shown to induce fruit yield/plant and average fruit weight. In addition, Vashisth and Nagarajan [26] suggested that, the effect of MW may be resonance like phenomenon which increases the internal energy of seeds to get higher yields. In addition, the remarkable improvement induced by the magnetic treatment was consistent with the results of other studies on other crops like cereal, sunflower, flax, pea, wheat, pepper, tomato, soybean and potato. In these studies the crop yields were increased [6, 27-32].

The Impact of Magnetic Water Application for Improving Common Bean (*Phaseolus vulgaris* L.) Production

Helal Ragab Moussa

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Abstract: The technology of magnetic water has widely studied and adopted in field of agriculture in many countries (Russia, Australia, USA, China and Japan), but in Egypt available review on the application of magnetize water in agriculture is very limited. Therefore, the present work was carried out to study the response of some growth characteristics, yield and some chemical constitute of common bean for irrigation with magnetized and tap water. Irrigation of common bean plants with magnetic water increased significantly the growth characteristics, potassium, GA_3, kinetin, nucleic acids (RNA and DNA), photosynthetic pigments (chlorophyll *a*, chlorophyll *b*, and carotenoid), photosynthetic activity ($^{14}CO_2$–fixation), and translocation efficiency of photoassimilates ($^{14}CO_2$–assimilation) as compared with control plants. Treatment with magnetized water had no significant effect on water content, malondialdehyde, and H_2O_2 contents as compared with the control. Also, there is a stimulation effect in the activities of the antioxidant enzymes (catalase, peroxidase, and superoxide dismutase) in the magnetized plants over the control. It appears that utilization of magnetized water (30 mT) can led to improve quantity and quality of common bean crop. It suggests that magnetic water could stimulate defense system, photosynthetic activity, and translocation efficiency of photoassimilates in common bean plants. So, using magnetic water treatment could be a promising technique for agricultural improvements but extensive research is required on different crops.
[Helal Ragab Moussa. **The Impact of Magnetic Water Application for Improving Common Bean (*Phaseolus vulgaris* L.) Production.** New York Science Journal 2011; 4(6):15-20]. (ISSN: 1554-0200).
http://www.sciencepub.net/newyork.

CONCLUSION

It appears that utilization of magnetized water (30 mT) can led to improve quantity and quality of common bean crop. It suggests that magnetic water could stimulate defense system, photosynthetic activity, and translocation efficiency of photo assimilates in common bean plants. We hope to attract the attention of scientific community to study this important phenomenon. Collaboration with physicists; biologists and physiologists are necessary in order to understand the mechanism of magnetic water action. Generally, using magnetic water treatment could be a promising technique for agricultural improvements but extensive research is required on different crops.

Appendix E

Morroco Full Report



MAGNETIC TREATMENT OF IRRIGATION WATER: ITS EFFECTS ON GROWTH, YIELD AND YIELD COMPONENTS OF SOME VEGETABLE CROP IN MORROCO

Presented by : **Mrs. Houda TAIMOURYA**
Supervisor: **Pr. Mohamed OUSSIBLE**

Magnetic Technologe

Utilization

Russia, Israël, Australia, Poland, Malysia, united states, Japan, China, portugal, England, turkey, etc

Application

- **Agriculture**
- **Environment**
- **Industry**

The magnetic treatment of water change the water structure:

- Microscopic (Électronic (**Pang XF., 2008),** Molecular (**Xantheas SS., 2000),** Atomic (**Chang TK. et Weng CI., 2008)).**
- Macroscopic (surface tension (**Lee SH., 2005**), Viscosity (**Wie M., 2000**), electrical conductivity **(Tai CY., 2008**), pH (**Quickenden T., 2002**)).

Plant reponse

Magnetic field have a positive effect on plant characteristics such as seed germination, seedling growth, agronomic traits and seed yield on different crop (**Atak Ç. 2000**).

The literatue survey covered the following areas:

- Increase in shoot and root regeneration.
- Increase in crop yield.
- Decrease of soil alkalinity.
- Earlier vegetation periods.
- Increase in mobile forms of fertilizers.

AIMS

The aim of the work is:

- to verify trends observed in the previous study.
- to test the efficacy of a magnetic treatment device to enhance growth of vegetal plant.

Reponse of growth, yield and yield components of potato for irrigation with magnetic treated and tap water



▪The experiment was conducted in douar Oulad Ben Omar in town the Deroua.
▪The area is about 2 Has.
▪The period among february-june 2012.
▪The plant material: potato (var.: Désirée).
▪The irrigation: drip.
▪The magnetic treatment: magnetic device (production by Magnetic Technologies L.C.C., Russia, branch United Arab Emirates).



▪The protocol: to comparison between irrigation with magnetize and tap water on growth, yield and yield components.

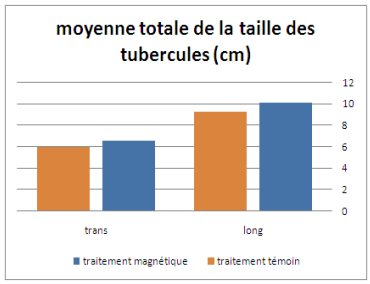


▪ parameters compared:
✓ the 115DAS: plant height, number of branch , plant fresh weight, fresh and dry weights of roots, dry matter, leaves fresh weight, yield and la tuber quality (longitudinal and transverse diameter).
✓ the day of harvest: yield .
▪Statistical analysis: a student test (t-test) was done to find the significant différences between magnetic and nonmagnetic water treatments using SAS program.

Results

➢The 115 DAS:

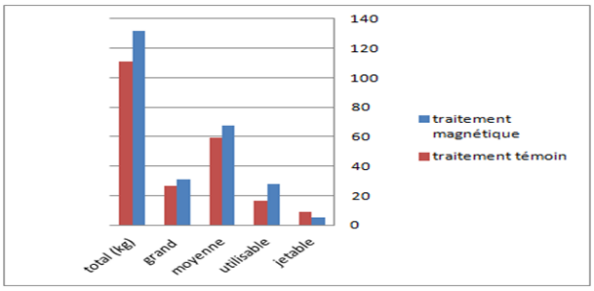
traitement	Hauteur (cm)	Nombre de tige	Poids frais (g)	Poids frais des racines (g)	Poids sec des racines (g)	Matière sèche de l'ensemble aérienne (g)	Poids frais des feuilles (g)C
T1	88,9	3	1230,62	59,78	14,37	118,54	436,32
T2	81,5	2,2	855,26	37,76	8,22	97,03	329,25
Pr>F	0,07	0,06	0,02	0,02	0,03	0,01	0,11
D° sign	---	---	*	*	*	*	---



	Poids des tubercules (g)	Diamètre longitudinal (cm)	Diamètre transversal (cm)
Pr>F	0,0960	0,0980	0,0095
Degré de signification	---	---	*

➢ the day of harvest:

	jetable	déchet	Calibre moyen	Grand calibre	totale
T.M	5,32	27,79	67,45	31,15	126,40
T.T	8,73	16,35	59,16	26,91	102,42
Pr>F	0,18	0,35	0,42	0,84	0,7
D° sign	---	---	---	---	---





témoin



Traitée magnétiquement

Reponse of growth, yield and yield components of cabbage for irrigation with magnetic treated and tap water



Materials and methods

- The experiment was conducted in douar Oulad Ben Omar in town the Deroua.
- The area is about 2 Has.
- The period among july-september 2012.
- The plant material: : the cabbage (var.: Santos).
- The irrigation: drip.
- The magnetic treatment: magnetic device (production by Magnetic Technologies L.C.C., Russia, branch United Arab Emirates).
- The protocol: to comparison between irrigation with magnetize and tap water on growth, yield and yield components.
- The experimental: random and simple to compare two factors: the first (fixed: Compare Both treatments (T1 and T2), the second (random and Subordinate to the first, to examine whether this effect is always away from the magnetizer distance).
- Parameters compared:

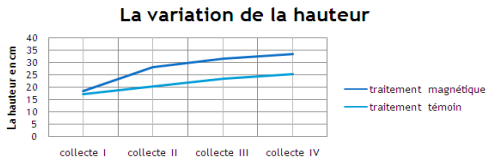
✓Plant height : regularly.
✓Outer contour: the 109 DAS.
✓Middle weight: the harvest day.

- Statistical analysis: Method of analysis of variance (ANOVA) with two classification criteria (treatments and sousparcelle), was done to find the significant différences between magnetic and nonmagnetic water treatments using SAS program.



Results

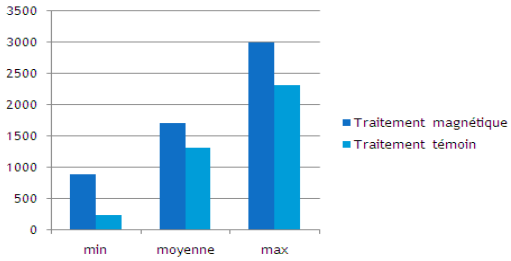
✓ Plant height:



	Traitement magnétique	Traitement témoin	Degré de signification
Collecte I	18,58	17,20	*
Collecte II	28,08	20,45	***
Collecte III	31,43	23,62	***
Collecte IV	33,41	25,41	***

	Traitement magnétique	Traitement témoin	Degré de signification
Contour	49,62	40,46	***

	Traitement magnétique	Traitement témoin	Degré de signification
	1704,85	1321,95	***





témoin Traitée magnétiquement

Reponse of growth, yield and yield components of strawberry for irrigation with magnetic treated and tap water

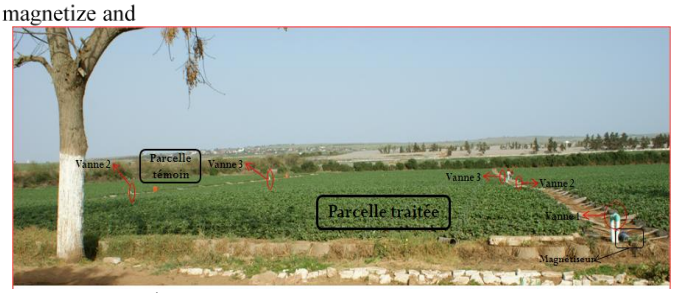


Méthodologie de travail

▪The exploitation "Dirafrost MOROCCO" located in the perimeter of Loukkos, 20 km south of Laarache.
▪ The area is about 2,3 has.
▪The period among february-june 2012.
▪The plant material: : the strawberry (var.: Camarosa).
▪The irrigation: drip.



▪The magnetic treatment: magnetic device (production by Magnetic Technologies L.C.C., Russia, branch United Arab Emirates).
▪ The protocol: to comparison between irrigation with magnetize and tap water on growth, yield and yield components.
▪ The experimental: random and simple to compare two factors: the first (fixed: Compare Both treatments (T1 and T2), the second (random and Subordinate to the first, to examine whether this effect is always away from the magnetizer distance).

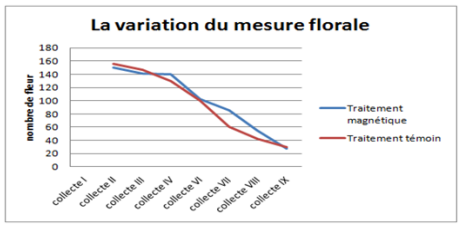


▪ Parameters compared:
✓ floral measures:
✓ Yield:
✓ fruit quality: fruit size in 3 diameters: <=35mm; 35< <= 45mm and >45mm.
▪ Statistical analysis: Method of analysis of variance (ANOVA) with two classification criteria (treatments and sousparcelle), was done to find the significant différences between magnetic and nonmagnetic water treatments using SAS program.

Results

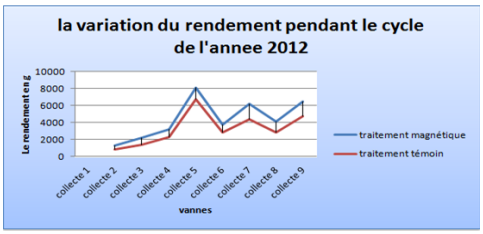
✓ floral measures (100 plants:

	Traitement magnétique	Traitement témoin	Degré de signification
Collecte 14 03	150,5	155,66	----
Collecte 20 03	140,95	146,75	----
Collecte 26 03	140,41	129,41	*
Collecte 18 04	103	100	----
Collecte 25 04	85,16	60,16	***
Collecte 22 05	54,91	42,25	***
Collecte 31 05	27,58	30,08	----



✓ yield (100 plants):

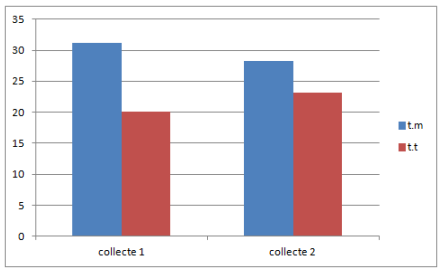
	Traitement magnétique	Traitement témoin	Degré de signification
Collecte 14 03 2012	1314,39	799,87	***
Collecte 20 03 2012	2188,55	1404,04	***
Collecte 26 03 2012	3209,12	2296,27	***
Collecte 05 04 2012	8102,83	6731,8	*
Collecte 18 04 2012	3718,28	2854,52	**
Collecte 25 04 2012	6164,25	4398,21	***
Collecte 22 05 2012	4128,1	2873,25	*
Collecte 31 05 2012	6481,78	4706,98	***



✓ **fruit quality:** fruit number whose size is > 45 mm (100 plants):

	Traitement magnétique	Traitement témoin	Degré de signification
Collecte 05 04	28,33	23,16	*
Collecte 26 03	31,16	20,08	***





Using magnetic water treatment could be a promising technique for agricultural but extensive research is required on different crop



Appendix F (Photo Networking Archive)



Report by Prof. Youri Tkatchenko to
a Committee of Science and Technology
Of Supreme Soviet USSR, 1990



Scientists of our company meeting
Russia's Prime Minister, 1991



With a Minister of Communal Economy
of Russia, 1992



With a Minister of Economy of
Russia, 1993



Meeting with a Prime-Minister and
government Members of Sultanate of Oman, 1995



Deputy of Prime-Minister of Agriculture of Egypt, H.E. Mr. Yusef Wali, while visiting stand of "Magnetic Technologies" In the agricultural exhibition in Cairo, Egypt, 1996



Presentation of our company's accomplishments
To His Highness Crown Prince of Dubai and a
Minister of Defence, U.A.E,
Sheikh Mohammad Bin Rashid Al Mactoom,
while visiting office Of "Magnetic Technologies",
1998



Presentation to His Highness Sheikh
Sultan Bin Khalifa Bin Zayed Al
Nahayyan, Minister of Oil Production
U.A.E., and His Highness Yusef Bin
Omair, Minister of Petroleum and
Mineral Resources, U.A.E in Petrol
and Gas Exhibition in Abu Dhabi



With a Minister of Agriculture of Malaysia, Datuk Amar Dr. Sulaiman Haji Daud, 1999



Mr. Junaid Khoori and Prof. Youri Tkatchenko while visiting Pt. Sari Karim, a Sole Agent of "Magnetic Technologies" in Indonesia, 1999



Scientific Seminar conducted in Indonesia, 1999



Business meeting with Egyptian businessmen in Cairo, 1996



Scientific Seminar on Applications of Magnetic Technologies in Cairo, Egypt, 1999



Press-Conference on announcing results of "Magnetic Technologies" on application of different agricultural Sectors in Egypt, 1998



Meeting with His Highness Sheikh Sultan Bin Mohammad Al Qasimi, Ruler Of Sharjah



Meeting with His Highness Prince Abdul Bin Fahad Bin Abdul Rahman Al Saud in Dammam, Saudi Arabia



Directors of "Magnetic Technologies" while Demonstrating Cryogenic Technologies, Ice under direct sunlight, temperature of the air Being +48° C



Presentation meeting with His Highness Sheikh Hamad Bin Tahnoon Al Nahayyan, Head of Department of Industry in the Emarat of Abu Dhabi



Deputy Minister of irrigation and natural resources of Sudan Mr. Ali Ahmed talking with the representative of Magnetic Technology company Mr. Kameel Fayad.
Water Equipment and Technology Expo. Khartoum, 29, Oct -5 Nov, 2001



Visit of His Highness Crown Prince and Vice President of Sharjah to the stand of Magnetic Technologies LLC on the 1 st Conference of alternative medicine 2003



WETEX 2005, 1-3 Feb, 2004



WETEX 2005, 1-3 Feb, 2004