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Device for magnetic treatment of irrigation water and its effects on quality and yield of banana plants

Ajitkumar Gorakhanath Patil

Shri Bhagubhai Mafatlal Polytechnic, Vile Parle (West), Mumbai – 400 056, India

Email address

agpatil@rediffmail.com

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Abstract

The present work relates to development of device for treatment of water by exposing it to magnetic field and its effect on quality and yield of banana plants. Valid scientific experiments on treatment of irrigation water using magnetic device have proved that water activated using specific arrangement of magnets and their housing helps in agriculture for improvement of germination, plant growth, flowers, fruit and crop yield. This also prevents from forming white salty deposits near the plant. A well structured research was conducted on five hector banana farm using 'Sadahara 207' magnetic water treatment device. The area was divided in to two plots and tests were conducted. It was observed that, the average yield per plant in magnetically treated plot was 19 kg compare to its counterpart conventional plot was 15 kg. Hence, the total difference in yield between two plots for 10000 plants was 40 Tons, which was 26.67 % more than the conventional plot. The experiments have also shown that there was dramatic difference in other parameters like quality and general appearance also.

1. Introduction

There has been tremendous need of water for irrigation around the world. Long spell of drought, deserts, underground saline water and competing water demands in most of the parts have put enormous pressure on water resources [4]. Accumulation of excessive salt in irrigated soils can reduce crop yields, reduce the effectiveness of irrigation, ruin soil structure and affect other soil properties. Further, it is difficult to clean the inside of conventional apparatus and pipelines due to their complicated arrangements. Appropriate strategies will have to be developed to avoid risk to future water supplies. As the good quality water is mostly required to satisfy thrust of growing population, there is pressure on use of water for irrigation. Therefore, this stresses the need for appropriate strategies to conserve the water and at the same time increase the productivity of vegetables, fruits and grain. One of the ways by which we can reduce the total water used for irrigation is to employ practices that improves crop yield per unit volume of water used. A magnetic water treatment device has been developed and used on banana plants to check its effectiveness. There is hardly any study reported with valid scientific experiments, on the effects of magnetic treatment of water on crop yield [4]. However, some beneficial effects of magnetic field have been reported on closely related studies in a number of farming situations.

2. Material and Method

The present work relates to magnetic device for treatment of water by exposing it to magnetic field and its effect on quality and yield of banana plants. More particularly, the work relates to a magnetic water activation device using specific arrangement of magnets and their housing. The water activated using this process is useful for drinking, agriculture and other purposes. When the water is exposed to the magnetic field in a proper manner, it gets activated and the size of molecule group gets reduced [5]. This type of magnetic activation helps to reduce accumulation of hard scale, lime and similar deposits in the water. This also improves the taste of water and prevents forming of rust and or scale.

My valid scientific experiments on treatment of water using magnetic device has proved that water activated using specific arrangement of magnets and their housing helps to improve quality of water that can be used for all purposes. It has also been observed that magnetically activated water used in agriculture helps for improvement of germination, plant growth, flowers, fruit and crop yield. This also prevents from forming rust and scale in the apparatus or pipelines.

Electro-magnetic agitation of mineral ions in water or fluid to reduce rust and scale has been used by number of ways. However, these conventional devices are not much effective due to their design. The devices running on electrical power are very expensive and complicated. They also consume lot of electricity and need regular maintenance. Some devices make use of permanent magnets. But, these devices suffer from incorrect design and magnetic flux distribution. This results into improper activation of water. In most of these devices water to be treated is arranged to come into direct contact with permanent magnets. Such an arrangement is unhygienic. Furthermore, magnetic force of the magnets gets weakened due to direct contact with the water.

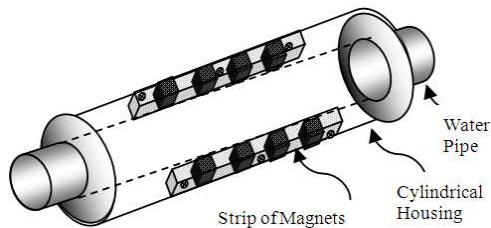


Fig. 1. Construction of Magnetic Water Treatment Device

The present device is very simple in structure, inexpensive and possesses unobstructed flow of water through properly arranged and distributed magnetic field [1]. The construction of device is shown in fig. 1. It has cylindrical housing with circular slot for water pipe. The cylindrical housing is made from Ferro-magnetic material such as mild steel. Magnets are fixed on 'U' shaped strip from inside at regular intervals as shown in fig. 2. The magnet holding strip is made from non magnetic material like stainless steel. The gap between the magnets is filled with epoxy resin or similar substance [2]. This prevents magnets from coming in contact with water directly. Rivet holes are provided at either ends to fix it on cylindrical

housing from inside.

Two similar magnet strips are used with each magnetic water treatment device. Here, south poles of upper strip and lower strip are fixed exactly opposite to each other. Different types of water can be treated using this principle. Water is allowed to flow through the inner pipe and magnetic field exposure is about 1-3 seconds depending on flow of the water. The diameter of inner water pipe and size of magnets depends on the capacity of the device [1]. The strength of the each magnet is maintained to 10-12KG. The device can be installed in any position, vertical, horizontal or angular as per the space available [2].

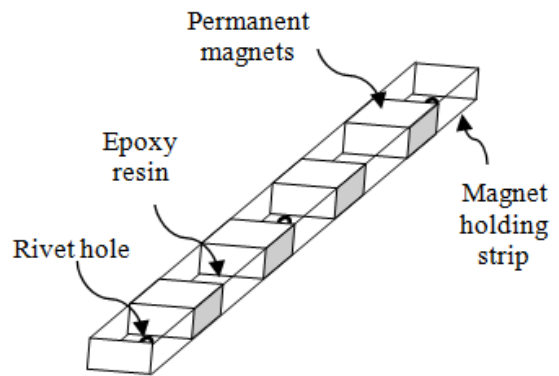


Fig. 2. Strip of Magnets

Any type of non magnetic pipe such as plastic or PVC can be used with this device for magnetic water treatment. A water pipe is passed through the device. It gets locked in to the device and no additional fixing is required.

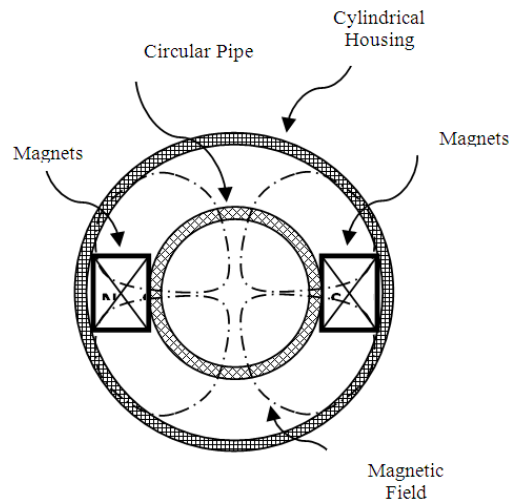


Fig. 3. Cross section of Magnetic Water Treatment Device

The cross section of magnetic water treatment device is shown in fig. 3. The outer ring is mild-steel housing; middle ring is the circular passage for water pipe. South poles of the magnets on the magnet holding strip face each other and produce strong magnetic field inside the water passing through water pipe. This is a best scientifically proved arrangement of magnets as per my experiments on magnetic activation of

water.

A well structured research was conducted with proper field tests and results were obtained [3]. The experiment was conducted for banana plants on five hector banana farm using 'Sadahara 207' magnetic water treatment device [2]. The plantation area was divided into two plots and tests were conducted. The details of plot size, number of plants, type of soil, variety of plant and type of irrigation are given in Table I.

Table I. Details of Plantation

Sr. No.	Parameter	Details
1	Area under experimental plantation	2.4 ha.
2	Area under conventional plantation	2.8 ha.
3	Number of banana plants under experimentation	10000
4	Number of banana plants under experimentation	12000
5	Planting material for both plots	Sowed suckers of normal size (Coconut shape 450-750gm.Wt.)
6	Variety of banana	Shrimanti (AAA), Sub Clause of Basrai
7	Soil type of Experimental Plot	Deep Black Cotton Soil.
8	Method of Irrigation for both plot	Drip irrigation (in line drippers)
9	Type of water	Ground, well irrigation water

3. Results and Discussion

The experiments were conducted on five hector plot to examine the effect of magnetic treatment of ground irrigation water, on productivity of banana plant. The study was

conducted under Indian conditions with day and night temperature between 30°C and 15°C in the banana farm.

Two factors were considered in the study: effect of untreated ground irrigation water and magnetically treated ground irrigation water on banana plants. The plot that was irrigated using untreated ground irrigation water was defined as conventional plot, whereas the plot that was irrigated using magnetically treated water was defined as treated plot. To understand the impact of magnetic treated water on growth of plants; both plots were continuously monitored. As the main aim of the study was to find out improvement in productivity of banana plants; and the sample size was very high i.e. 12000 and 10000 plants for conventional and treated plots respectively; it was difficult to measure general parameters of each plant and compare during study. Therefore, observations apart from yield noticed during study were restricted to general comparison as presented in Table II.

It was observed that there was appearance of white salty deposits near the drip outlet of each plant. That means plant didn't consume the salts present in the water, whereas, no such deposits were observed in treated plot. This indicates that plants, which used treated water consumed salts for their growth. The probable reason for this may be the size of salt crystals; as magnetic treatment reduced the size of crystals below the diameter of capillaries in the roots of plant; plant absorbed those crystals. Other parameters; pseudo stem height, girth, number of leaves, functional leaves, days of flowering and days between flowering and harvesting were observed. In all cases treated plot performance was far better than congenital plot. It was also observed that percentage of flowering & harvesting in treated plot was 15 % better than untreated plot.

Table II. General Observations

Sr. No.	Parameter	Conventional Plot	Treated Plot
1	Appearance of salt	White salty surface appeared near the drip outlet (near each plant).	No any salt appeared
2	Pseudo stem height	Less	More
3	Pseudo stem girth	Less	More
4	Number of leaves/plant	Less	More
5	Number of functional leaves per plant	Less	More
6	Days of flowering	Less	More
7	Days of harvesting	Less	More
8	Days flowering to harvesting	Less	More
9	Percentage of flowering & harvesting	More (95%)	Less (80%)

Table III. Yield Parameters

Sr. No.	Parameter	Conventional Plot	Treated Plot	Increase in Yield
1	Average number of hands/bunch	Less (7.5)	More (9.5)	26.67 %
2	Average number of fingers/bunch	155	180	16.13 %
3	Bunch Weight	15 - 16 kg.	19 - 20 kg.	25 %
4	Bunch Size/Shape	Less	More	—
5	Finger Length (cm)	Less (19-20cm)	More (23cm)	15 %
6	Yield per plant	15 kg	19 kg.	26.67%
7	Total yield for 10000 plants	150 Ton	190 Ton	26.67%

Table III compares the yield from both the plots. It was observed that an average number of hands per bunch were 26.67 % more than the conventional plot in treated plot. The average number of bunch in conventional plot was 7.5, whereas it was 9.5 in treated plot. Average number of fingers/bunch was also better in treated plot. Treated plot had 180 fingers per bunch compare to conventional plot that had only 155 fingers per bunch. The weight of bunch in treated plot was 25% more than the conventional plot as the size of each finger was more. The length of finger was also compared. The treated plot fingers had 15 % more length than conventional plot plants. Finally, coming to the yield per plant, there was dramatic difference between treated and untreated plots. The average yield per plant in treated plant was 19 kg compare to its counterpart which was 15 kg in conventional plot. Therefore, total difference in yield between two plots for 10000 plants was 40 Tons, which was 26.67 % more than conventional plot.

The photograph of banana plant with banana hands and bunches harvested using magnetically treated water is shown as fig.4. The average number of fingers is 180 in treated plot compare to 155 in untreated plot.



Fig. 4. Banana Hands and Bunches in Treated Plant

Table IV presents observations related to quality. Here, comparison was done between two plots for parameters like: color of fingers, appearance, luster, ripe, attractiveness and sweetness. In all the cases findings of treated plot were encouraging compare to untreated plot. The color of leaves that used magnetically treated water was dark green compare

to untreated plot. There was uniform distribution of hands and fingers in treated plot and final product was attractive in treated plant. Other observations are listed in Table IV.

Table IV. Quality Parameters

Sr. No.	Parameter	Conventional Plot	Treated Plot
1	Color of Fingers	Light Green	Dark Green
2	General appeal/appearance	Less attractive	More attractive
3	Luster (Sli of Fruit)	Less	More
4	Ripening	Less Uniform	More Uniform
5	Developed attractive color	Less	More
6	Sweetness	Less	More

4. Conclusion

Valid scientific experiments on treatment of water using magnetic device has proved that water activated using specific arrangement of magnets and their housing helps to improve quality of water for irrigation. Magnetically treated water used for irrigation of banana plants has resulted in statistically significant increase in the yield.

The observations on quality assessment indicate that magnetic treatment enhances the overall physical characteristics of the fruit. It has also been observed that magnetically activated water used in agriculture helps for improvement of germination, plant growth, flowers, fruit and crop yield. This also prevents from forming white salty deposits near the plant.

The magnetic water treatment device has cylindrical housing with circular slot that holds water pipe of non-magnetic material such as plastic or PVC with ease. The water pipe gets latched in to the slot due to its matching diameter and the surface of water pipe. As the device is sealed from outside and circular slot is provided to fix water pipe, it is flame proof, water proof and also shock proof as it doesn't use electricity. It is substantially rigid and can be installed in any position: vertical, horizontal and angular. It can be also used from both sides to fit either left to right water flow or right to left water flow.

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Biography



Prof. (Dr.) Ajitkumar Gorakhanath Patil

was born in India on 19th March, 1958. He acquired MS degree in Electronics and Control from Birla Institute of Technology and Science, Pilani, India, and Ph.D. in Instrumentation Engineering from SGGS Institute of Engineering and Technology, Nanded, India. He is associated with S.B.M. Polytechnic, Mumbai since 1979 and worked as a Head, Department of Medical

Electronics. He is recipient of: National Award for Outstanding Work and Role Model from the President of India, NRDC National Invention Award, UP Government-ISTE National Award, State Teacher Award, IETE-RSK Gold Medal and Vijay-Ratna Award. He is associated with number of national and International organizations.