A Novel Approach to Increase the Growth Level of Papaya Plants Using MME Method

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Abstract – This paper presents the MME method process that is the effect of Electric as well as Magnetic field separately on the young papaya plant growing before Monochromatic light (Sodium vapour lamp). Growing between with and without electric and magnetic field is presented. This research is focused on the height of stems. The changing of papaya sprouts are observed every day last for 7 days. The growth during the exposure is determined and graphed. Experimental results indicate that the papaya sprout in electric and magnetic field has a better growth while compare to that of without electric and magnetic field that is no field based on statistical analysis.

Index Terms – Sodium Vapour lamp, Growth of papaya plants, AC and DC currents, Magnetic poles, yield increased growth.

1. INTRODUCTION

The geomagnetic field is a natural component of our environment. A scientist Gilbert describes about the magnetism and said, the earth acts as a large magnet and its field spreads over 10^{-4}Tesla at the top surface of the earth.

When a bar magnet hanged on the earth's surface it becomes rest position approximately along the geographical north-south direction. While compared with geographic north-south direction the bar magnet becomes rest at 17^0 moved position[6]. By thus we well known earth behaves like a huge magnetic dipole. Since the north pole of the bar magnet approximately point towards geographic north (N_G) so, that pole is considered as magnetic south pole (S_M). Like that the south pole of the bar magnet approximately points towards geographic south (S_G). So, that pole is considered as magnetic north pole (N_M)[20].

The space in which a magnetic pole experiences a force is defined as magnetic field. The magnetic field of earth acts on bar magnet is shown in figure1.

We can also map the magnetic field by the use of a bar magnet. Let us considered a bar magnet is placed on a plane sheet of a paper. A compass needle is placed near the north of the magnet. The north and south pole of the compass are marked by pen dots. The compass needle is shifted and placed so that its south pole touches the pen dot marked for the North Pole[20].

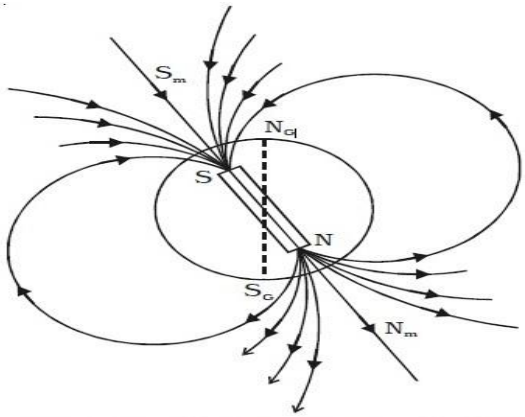

Figure 1: Magnetic field of earth on bar magnet.

This process is repeated. By thus we gained some series dots. When we join the spotted dots we get a smooth curve. By thus we mapped the magnetic field. When the north pole of the bar magnet kept in a north pole of the geomagnetic field then the map of the magnetic field as like shown below in figure 2.

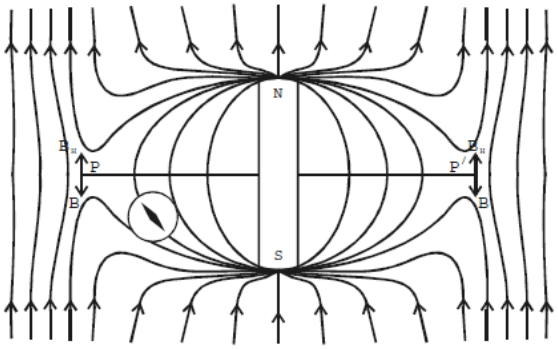

Figure 2: North Pole of the bar magnet kept in a north pole of the geomagnetic field's mapped image field

When the south pole of the bar magnet kept at the north pole of the geomagnetic field then the map is shown below in figure 3.

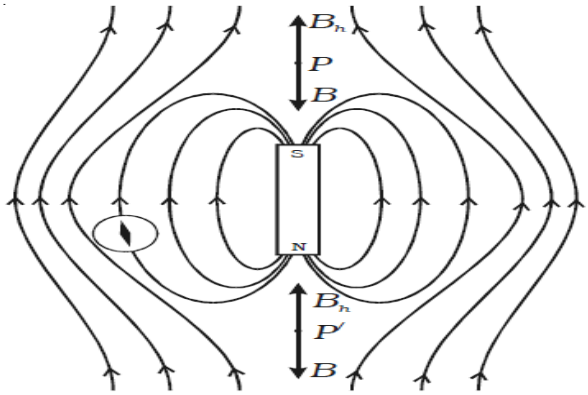

Figure 3: South Pole of the bar magnet kept in a north pole of the geomagnetic field's mapped image field

And then magnetic induction is the fundamental character of a magnetic field at a point. Magnetic induction at a point in a magnetic field is the force experienced by unit North Pole placed at the point. It is denoted as B[20].

Due to electromagnetic induction we are producing the current by dynamo. In dynamo mechanical energy is converted into current energy [4][9][10]. Current energy is classified as

- Direct current
- Alternating current

The current whose magnitude and direction does not vary with time is called direct current (DC) [4][18]. The current whose magnitude continuously changes with time and periodically changes its direction is called alternating current (AC)[4][9][10][18].

By applying electricity, magnetism, sound and monochromatic lights such as sodium vapour lamp, mercury vapour lamp etc can stimulate the growth of plants to a great extent[8][11][12][14]. This technology can accelerate the plants growth rates, increase yields and improve crop quality[13][15][19]. These cultures protect the plants from diseases, insects, frost and reduce the requirement of fertilizer [16][17][21][22].

2. RELATED WORK

In 2002 L.Kordas applied magnetic field to spring wheat to increase the growth and the yield. On that effect of bio-stimulation of spring wheat green tops in the first stage of development were little small. The growth of plants got slightly weak and from the stage of first node there was observed a certain power exercised over spring wheat of that factor it makes less height of plants in development stages. Much more clear action of magnetic field was observed when it was applied to the root system[1].

Bio-stimulation of green tops or root systems of plants brought about make less of their height by respectively 8% and 11% is relation to control treatment. Bio-stimulation significantly power exercised over the height of plants [1].

In 2014 Stanislaw Pietrus Zewski and Elvira Martinez make a new critical survey on magnetic field as a method of improving the quality of sowing material. On that, five spring wheat (Banti, Lagva, Parabola, Sewilla and Zura) cultivates were subjected to pre-sowing treatment with alternating magnetic field. Two different doses were applied D_1=21.50 KJm^{-3}s (30mT, 30s) and D_2=7.16 KJm^{-3}s (30mT, 10s). Each and Every hour, germination kinetics was measured by means of the electronic seed germinator. Then it describes as logistic curve and parameters were resolved and concluded. The resultant record gives the positive responses [2].

In 2012 Tereshkina Tatiana Albertovna analyses the review on the effect of electricity on plants growth. On that assumption the radish seeds were raise up by the use of direct current electric voltages will grow more quickly. The same hypothesis was proven on bean seeds [3].

In 1840's W.Ross of Newyork applied direct current to the potatoes and that result was also yield increases up to 25% [4].

N.F.Kozhevnikova and S.A.Stanko experimented with Alternative current effects on certain seeds. For that green mass is increased by 10% to 30% and yield grain by 0% to 10% [5].

3. PROPOSED MODELLING

Basically the ions in the plant food and water carry an electrical charge and flow along the earth's magnetic lines and same as properly placed magnet and electric field allows the food and water to flow to the plant's growing cell faster. Form NASA image starch from a plant cell is given in below figure.

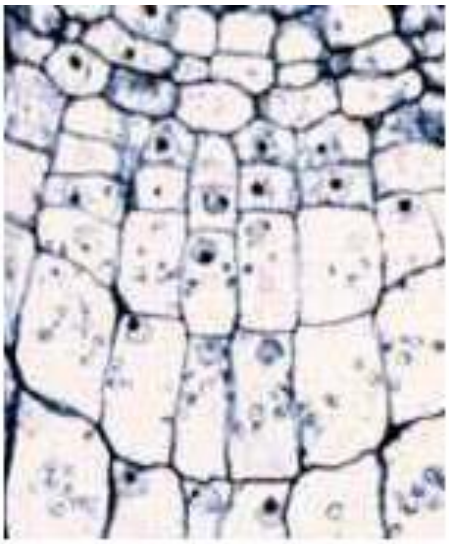

Figure 4: Starch on a plant cell

As the starch and ion grains attracted by the magnet, the plants would be giving a slope to grow towards that direction.

In this paper we are applying separately electric AC and DC and also magnetic separate poles as by perpendicular, parallel and by hanging positions to the selected papaya plants and keeping these plants in the presence of monochromatic light.

Magnetic north and south pole perpendicular to plant:

Figure 5: North Pole perpendicular to plant

In the north pole of the magnet perpendicular to the plant's position, the north pole of the magnet set as it is perpendicular to the plant. Where in the above picture the red colour thing is magnet and the white colour dot represents it is the North Pole.

Figure 6: South Pole perpendicular to plant

The above picture represents the south pole of the magnet perpendicular to the plant. That's why here the white colour dot is in the reverse position.

Magnetic north and south pole parallel to plant:

Figure 7: North Pole parallel to plant

This above picture denotes the north pole of the magnet is parallel to the selected papaya plant. This type of system may also gain some growth than the no applied system.

Figure 8: South Pole parallel to plant

In the above picture the white dot side that is the north pole of the magnet faces down side. So that the south pole of the magnet faces upper side. By thus we easily fix like the south pole of the magnet parallel to the selected papaya plant.

Magnetic north and south pole hang upon plant:

Figure 9: North Pole hangs upon the plant

Where here the magnet is tied very tightly by thread and hanged on the stand. The face of the North Pole faces the top of the selected plant.

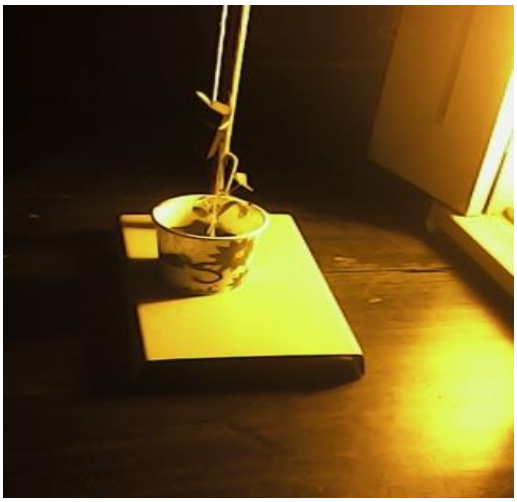

Figure 10: South Pole hangs upon the plant

Same as North Pole faces the top of the plant here the south pole of the magnet faces the top of the selected papaya plant. The sodium vapour lamp is in the on condition. It gives light source. Form that light source the selected papaya plant produces the starch that is its food. The magnetic waves of the magnet which is in the hanged position must make some changes on the food production on that selected papaya plant. So the food particles at papaya plant motivate the steam to grow higher.

Applying AC current:

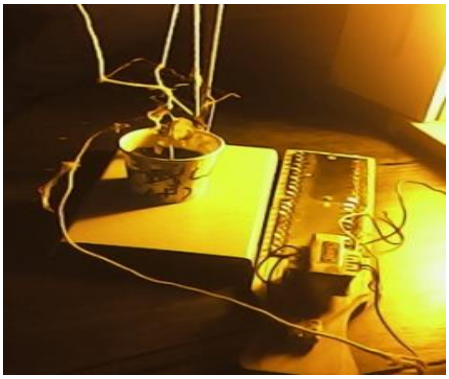

Figure11. Applying Alternative current's positive end

The above picture shows applying alternative current's positive end faces the top of the plant in before monochromatic light.

Figure12. Applying Alternative current's negative end

The above picture shows applying alternative current's negative end faces the top of the plant.

Applying DC current:

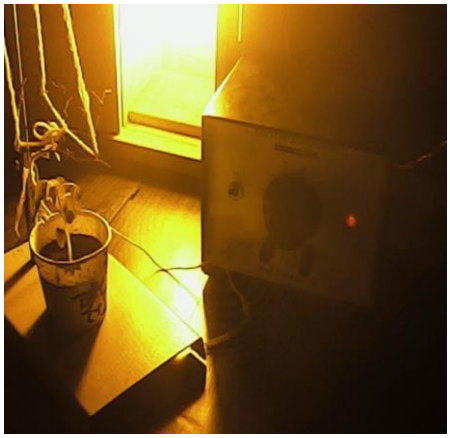

Figure13.Applying Direct current's positive end

The above picture shows applying direct current's positive end faces the top of the plant.

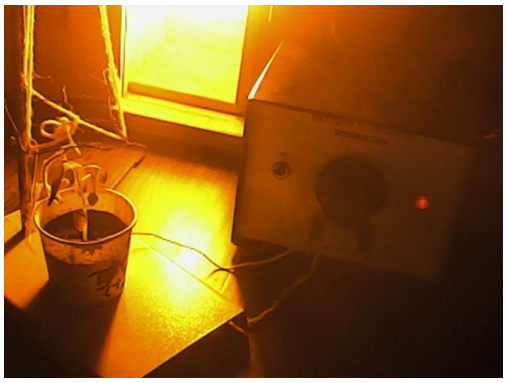

Figure14. Applying direct current's negative end

The above picture shows applying direct current's negative end faces the top of the plant.

Applying No Field:

Figure 14.Applying no field

The above picture shows no field applying on the selected papaya plant. By thus the fields we are using such as magnetic and electric are not used here. And also the monochromatic light that is the sodium vapour lamp is not used here. Therefore a selected papaya plant is planted in a certain separate cup and placed in front of the sun light as a growth of a plant in a ordinary conditions same as a plant in a earth's land. And noted the growth of that selected papaya plant every evening for seven days. These readings are very useful to compare with the applied field's one.

4. RESULTS AND DISCUSSIONS

Table 1: Magnetic north and South Pole perpendicular to plant:

Days	**North pole plant height (Perpendicular)**	**South pole plant height (perpendicular)**	**No field plant height**
Initial	2.3	2.0	2.4
D 1	2.3	2.0	2.4
D 2	2.4	2.1	2.5
D 3	2.5	2.3	2.6
D 4	2.7	2.5	2.6
D 5	2.9	2.8	2.7
D 6	3.1	3.1	2.8
D 7	3.4	3.4	3.0

Table 2: Magnetic north and South Pole parallel to plant:

Days	**North pole plant height (parallel)**	**South pole plant height (parallel)**	**No field plant height**
Initial	2.1	2.3	2.4
D 1	2.1	2.3	2.4
D 2	2.3	2.5	2.5
D 3	2.5	2.7	2.6
D 4	2.7	3.0	2.6
D 5	2.9	3.3	2.7
D 6	3.2	3.6	2.8
D 7	3.5	4.0	3.0

Table 3: Magnetic north and South Pole hang upon plant:

Days	**North pole plant height (hang upon)**	**South pole plant height (hang upon)**	**No field plant height**

Initial	2.1	2.4	2.4
D 1	2.1	2.4	2.4
D 2	2.2	2.5	2.5
D 3	2.4	2.6	2.6
D 4	2.6	2.8	2.6
D 5	2.8	3.1	2.7
D 6	3.1	3.4	2.8
D 7	3.4	3.8	3.0

Table 4: Alternative current's positive and Negative end faces the top of the plant:

Days	**AC Negative junction faces top of the plant**	**AC Positive junction faces top of the plant**	**No field plant height**
Initial	2.4	2.3	2.4
D 1	2.4	2.3	2.4
D 2	2.5	2.4	2.5
D 3	2.7	2.5	2.6
D 4	2.9	2.6	2.6
D 5	3.1	2.7	2.7
D 6	3.4	2.9	2.8
D 7	3.7	3.1	3.0

Table 5: Direct current's positive and negative end faces the top of the plant:

Days	**DC Negative junction faces top of the plant**	**DC Positive junction faces top of the plant**	**No field plant height**
Initial	**2.4**	**2.2**	2.4
D 1	**2.4**	**2.2**	2.4
D 2	**2.5**	**2.3**	2.5
D 3	**2.6**	**2.4**	2.6
D 4	**2.8**	**2.5**	2.6
D 5	**3.1**	**2.8**	2.7
D 6	**3.4**	**3.1**	2.8
D 7	**3.8**	**3.5**	3.0

Graph 1: From all magnetic field tables

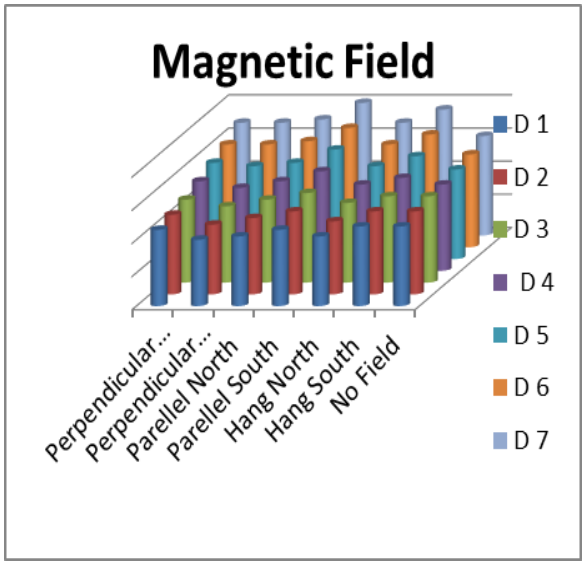

Figure 13: Graph for magnetic north and South Pole perpendicular, Parallel, Hang upon to the plant.

Graph 2: From all electric field tables

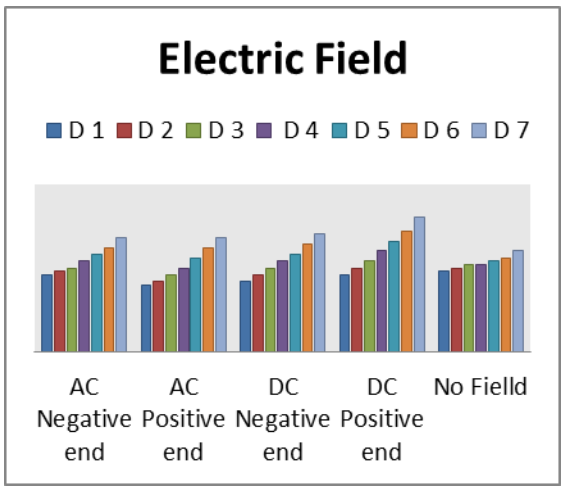

Figure 14: Graph for AC(-), AC(+), DC(-) and DC(+) terminals apply to the selected plant.

From All the tables:

The growth of plants for seven days is noted in centimetre scale. For perpendicular north the growth difference is 3.4 – 2.3 = 1.1 and for the perpendicular south is 3.4 – 2.0 = 1.4. Total difference in growth of the selected plant by applying magnetic field at perpendicular position is 1.4 – 1.1 = 0.3.

At in the parallel position the total increase for north side is 3.5 – 2.1 =1.4 and for the south side 4.0 – 2.3 =1.7. Total difference in growth of the selected plant by applying magnetic field at Parallel position is 1.7 – 1.4 = 0.3.

By the hanging position the total increase in north side is 3.4 – 2.1 = 1.3 and in the south side is 3.8 – 2.4 =1.4. Total difference in growth of the selected plant by applying magnetic field at Hanged position is 1.4 – 1.3 = 0.1.The average of increase in growth level of the selected papaya plants in total magnetic field is

$$= \frac{1.1+1.4+1.4+1.7+1.3+1.4}{6}$$

$$= \frac{8.3}{6}$$

$$= 1.38$$

For the no effect section 3.0 – 2.4 = 0.6

By thus the average of the magnetic field increased than no effect section is 1.38 – 0.6 = 0.78. So magnetic field is better for the growth of the selected papaya plant.

The growth difference on seven days for (- AC) is 3.7 – 2.4 = 13. and for the (+ AC) is 3.1 – 2.3 = 0.8. Total difference in growth of the selected plant by applying alternative currents is 1.3 – 0.8 = 0.5.

For (- DC) terminal is 3.8 – 2.4 = 1.4 and for the (+ DC) 3.5 – 2.2 = 1.3. Total difference in growth of the selected plant by applying direct current is 1.4 – 1.3 = 0.1.

The average of increase in growth level of the selected papaya plants in total current field is

$$= \frac{1.3+0.8+1.4+1.3}{4}$$

$$= \frac{4.8}{4}$$

$$= 1.2$$

For the no effect section 3.0 – 2.4 = 0.6

By thus the average of the electric field increased than no effect section is 1.2– 0.6 = 0.6. So electric field is also better for the growth of the selected papaya plant while compared with no field.

Magnetic Vs Electric field:

The average growth increase on applying magnetic fields is 1.4 and the average growth increase on applying electric field is 1.2. Therefore while applied of magnetic field is yield higher than the applied of electric field. The gain was happens by serving some few grams of water to the selected papaya plants. No fertilizer should be given to the planted plants.

5. CONCLUSION

While comparing magnetic, electric and no field magnetic field method is best for growth of papaya plant. This method is easy to implement and it decreases economic loss than that of electric field method. But comparing with no field growth process the both magnetic and electric field process is good for papaya plants growth. Less amount of water and no fertilizer given to the planted plant and gained more growth than the ordinary plant which is planted in separate cup placed in front of the sun light.

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