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POTENTIAL UTILIZATION OF ELECTRO-CULTURE TECHNOLOGY FOR PROMOTING PLANT GROWTH

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Abstract

Electricity plays a vital role in transmitting nerve signals in every animal species on earth, but plants too seem to be influenced by electric current, even though they have no nervous systems. Research workers are finding evidence that plant cells' sensitivity to electric current can be exploited to enhance their growth. Electro culture involves the study of the effects of electricity and electric fields on the rate of seed germination and plant growth. The application of electricity, magnetism, monochrome light, and sound can stimulate the growth of plants to a great extent. This little-known technology, called Electro-culture, can accelerate growth rates, increase yields, and improve crop quality. Electro-culture can protect plants from diseases, insects and frost. These methods also can reduce the requirements for fertilizer or pesticides. Farmers can grow bigger and better crops in less time, with less effort, and at a lower cost.

Key Words: Electro culture, electricity, plant growth.

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Electro-culture techniques:.

Some of the main effects that can be observed in plants after they have been stimulated with electricity include increased soil fertility, increased growth rate, increase in yields from 20 to 400%, larger sized fruits and vegetables and protection against various diseases. The several approaches to electro-culture include: antennas, static electricity, direct and alternating current. The energies are applied to the seeds, plants, soil or the water and nutrients.

Antenna Systems

Lazarenko *et al* (1966) mentioned that a French farmer Justin Christofloreau attracted attention in 1925 with his apparatus to collect atmospheric energy for his crops. Clover treated by his method grew 7 feet high. Christofloreau's apparatus consisted of a 25-ft wooden pole; at the top was a metal pointer aligned north-south, and an antenna. Copper and zinc strips were soldered together to generate electricity from solar heat. Several of the poles were set about 10 ft apart, and the wires leading from them extended about 1000 yards. Christofloreau claimed that the accumulated electricity destroyed parasites and promoted beneficial chemical processes in the soil.

Oscillator Circuit

Lakhovsky, G. (1924) devised his Oscillator Circuit, a one-turn copper coil with overlapping ends separated by a gap. Capacitance generates oscillating currents that benefit the plants. The ring is supported by an insulator such as a plastic rod. This extremely simple arrangement stimulates plant growth

A conical coil of stiff wire wound with 9 turns (counter-clockwise in the Northern Hemisphere, clockwise in the Southern), when stuck in the ground about 1 ft north of a plant, will collect atmospheric electricity. Connect a wire from the fence to a metal rod near the plants.

TV Antenna

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Rebar can be sunk into the ground at each end of a row of plants, connected by a bare wire under the soil and/or in the air. A north-south orientation will take advantage of geomagnetic polarity.

Electrostatic Systems

Electrostatic Systems Experimental study of the effects of electricity on plant growth began in 1746, when Dr. Maimbray of Edinburg treated myrtle plants with the output of an electrostatic generator, thereby enhancing their growth and flowering.

Aerial system

Lyman B. *et.al* (1926) and Scientific American (1905) published that in 1885, the Finnish scientist Selim Laemstrom experimented with an aerial system powered by a Wimhurst generator and Leyden jars. He found that the electrical discharge from wire points stimulated the growth of crops such as potatoes, carrots, and celery for an average increase of about 40% (up to 70%) within 8 weeks. Greenhouse-grown strawberry plants produced ripe fruit in half the usual time. The yield of raspberries was increased by 95%, and the yield of carrots was increased by 125%. However, crops of cabbage, turnips, and flax grew better without electrification than with it. The Laemstrom system comprises a horizontal antenna suspended high enough to permit plowing, weeding and irrigation. The voltage applied to the antenna varies from 2 to 70 KV, depending on the height of the antenna. The current is about 11 amps.

Blackman V.H. (1924) reported his experiments with an aerial system similar to that of Laemstrom. He applied 60 volts DC/1 milliamp through 3 steel wires each 32 ft long and suspended 6 ft apart and 7 ft high on poles. This arrangement yielded an average increase of about 50% for several plant types.

Effect of atmospheric electricity

In 1898, Grandeau and Leclerq studied the effect of atmospheric electricity on plants by covering part of a field with a wire net which shielded them from natural 4 electrical action. The uncovered plants grew 50-60% better than the shielded plants. Wet soil improves current flow. Electro-cultured

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plants require about 10% more water than control plants because the charged water is perspired more rapidly than under normal conditions. Positive results are always obtained except when ozone is formed by ionization. Negative aero-ions intensify cellular oxidation reduction processes, while the positives depress them.

Direct Current

Ross W.(1844) of New York reportedly obtained a severalfold increase in the yield of a field of potatoes when he buried a copper plate (5 ft x 14 ft) in the earth, and a zinc plate of the same dimensions 200 ft away. The two plates were connected by a wire above ground, thus forming a galvanic cell. In similar experiments by Holdenfleiss (1844) with battery-charged zinc and copper plates, yields increased up to 25%.

From 1918 to 1921 some 500 British farmers developed a shared system to treat their grain in an electrified solution of nutrients. The grain was dried before sowing. The farmers cultivated about 2,000 acres with the seed. The results were reported in Scientific American (15 February 1919)

In 1964, the USDA performed tests in which a negative electrode was placed high in a tree, and the positive electrode was connected to a nail driven into the base of the tree. Stimulation with 60 volts DC substantially increased leaf density on electrified branches after a month. Within a year, foliage increased 300% on those branches! Moore A . D.(1972)

Alternating Current

When using AC, great care must be taken to prevent electrocution of oneself and the plants. AC generally tends to retard plant growth except within certain narrow parameters of voltage and amperage. Dicotyledon plants increase in weight at 10 KV and 100 KV, but decrease in weight (as much as 45%) between 20 to 60 KV. Current must be very low, or plant growth will be retarded. Murr L. E. (1965) used aluminum wire mesh electrodes charged up to 60 KV, and found that monocotyledons increase in dry weight in an electrostatic (ES) field, but decrease in weight in an oscillating field. The dry weight of dicots increases about 20% when grown in an oscillating field, but decreases above 50 KV. The concentration of minor elements (Fe, Zn, Al) increases several hundred

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percent in active leaf tips, due to an increase in oligo-enzymes. The activity of these substances is accelerated so much that cellular respiration is impeded, resulting in deterioration and death. There appears to be no benefit from continual exposure of plants to an alternating electrical field. If such a system is used, voltages should not exceed 10 KV, and the current must be very weak. However, the results can be worthwhile**.**

Conclusion:

This is an area of science where a lot of experimentation needs to be conducted. Researchers are starting to find evidence that plant growth can be enhanced by taking advantage of the sensitivity of plant cells to electric currents. Observations have been made that certain types of grass appear healthier after a thunderstorm and grass that grows below an electric power cable generally look greener. However, these observations have been disputed by skeptics claiming that grass appear healthier after a thunderstorm as they have been given a good wash by the falling rain. As for the grass that grows under electric power cables, skeptics allege that the droppings from birds that sit on the power lines act help fertilize the grass. Certain scientists suggest that while plants need all the known conditions such as sufficient sunlight, air, water and nutrients to grow, the presence of an electric current help to enhance plant growth. Many electro culture experiments are being done in laboratories to show that introducing an electric or magnetic field will enhance plant growth and seed germination. This method can be used in plant nurseries to improve the yield of plants being nurtured. Thus there is a need to explore the potential of electro-culture technology Thus there is a need to explore the potential of electro-culture technology not only for plant improvement but also

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for developing technique to reduce dependence of the farmers on the excessive use of fertilizers and pesticides.

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