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Positively Charged Water as a Plant Germination Stimulator

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Abstract: There is a powerful electromagnetic force on Earth that moves positive charges up and negative charges down. This force participates in many phenomena occurring both in the Earth's atmosphere and on its surface, both in the grandiose and in the almost imperceptible. So, this force causes atmospheric discharges, both ascending currents of positive charges, namely, heavenly spirits and elves, and descending currents of negative charges, namely ordinary lightning. In addition, this force distributes the water within the clouds, directing the positively charged vapor upward and the negatively charged downward. Also, this force determines the ability of salts dissolved in positively charged water to form ascending plant-like crystals. All this made it possible to assume the participation of the same force in the distribution of water inside plants. In particular, it was assumed that under the action of this force, positively charged water moves upward inside the plants, and negatively charged water moves downward. Accordingly, it was assumed that positively charged water stimulates plant growth better than negatively charged water. Both of these assumptions have been verified experimentally. As expected, positively charged water stimulated the germination of various plants, while negatively charged water suppressed it. All this made it possible to propose a fundamentally new mechanism for the distribution of water inside vertical plants. In addition, other mechanisms were analyzed to explain the opposite effects of positively and negatively charged water on germinating plants.

Keywords: Plant, Growth, Stimulation, Water, Transpiration

1. Introduction

It was previously found that the evaporation of saline solutions prepared in positively charged water is accompanied by the formation of cubic or rhombic crystals, while the evaporation of saline solutions prepared in negatively charged water is accompanied by the formation of needle-like or plant-like crystals [1, 2]. Later it turned out that this dependence correctly describes the formation of crystals on horizontal surfaces, but is incorrect in relation to crystals that form on vertical surfaces. Thus, it was found that the drying of saline solutions prepared in positively charged water is accompanied by the formation of filamentous or plant-like crystals on vertical surfaces in contact with these solutions (Figures 1, 2) [1].

Trying to explain this dependence, I came to the need to take into account the electromagnetic force that constantly acts both in the atmosphere and on the surface of the Earth, causing both upward movement of positive charges and downward movement of negative charges, both atmospheric and ground ones, including aquatic [4 – 7].

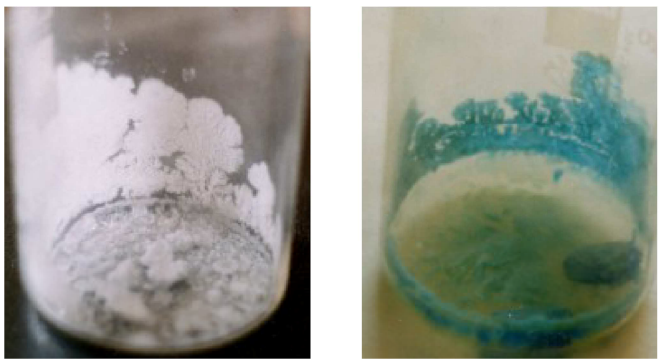

Figure 1. *These are fern-like crystals that formed on the walls of glass beakers when Na_2SO_4 (left) and $CuSO_4$ (right) solutions dried in positively charged waters [1].*

Initially, both saline solutions only covered the bottoms of the glasses.

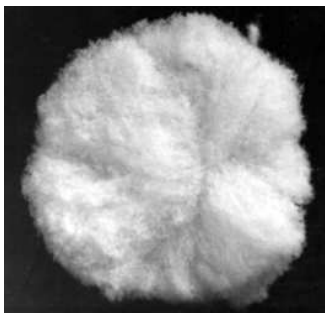

Figure 2. *These are threads that rise above the surface of drying silica gel, previously moistened with an aqueous solution of NaCl [1, 2]; since silica gel absorbs negative charges from water [3], these ascending filaments formed in the positively charged solution formed inside the silica gel capillaries.*

So, it was shown that this force is powerful enough to cause clearly noticeable atmospheric phenomena, including celestial discharges, moreover, both ascending, which are currents of positive charges, namely, sprites and elves, and descending, which are currents of negative charges, namely, ordinary lightning (Figure 3) [4].

Figure 3. *Higher: these are blue jets representing ascending currents of hydrated protons. Lower: these are ordinary lightings, which are downward flows of hydrated electrons [3].*

It is likely that similar ascending and descending electric currents also arise inside plants, manifesting themselves in the formation of their corresponding parts.

Of particular note is the similarity of the ascending and descending celestial electrical discharges (Figure 3) with the corresponding parts of plants, as well as the similarity of the ascending celestial electrical discharges with salt crystals growing vertically from solutions prepared on positively charged water (Figures 1, 2). It is this similarity that allowed us to assume that the same earthly electromagnetic force is involved in the formation of celestial electrical discharges, plants and salt crystals that form on vertical surfaces. In particular, it was assumed that this electromagnetic force distributes water inside plants in a similar way to how it distributes water vapor inside clouds (Figure 4) [4, 8].

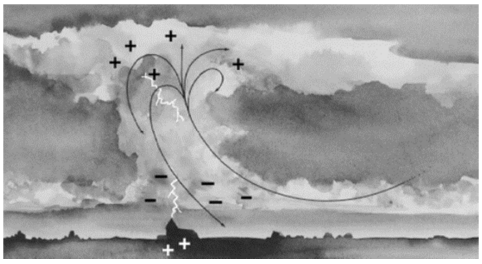

Figure 4. *Polarization of clouds: the lower part of a typical cloud has a negative charge and the upper part has a positive charge.*

The rising vapor loses its positive charge at the top of the cloud as a result of evaporation; the arrows show the downward vapor flows after its discharge in the upper part of the cloud [4, 8].

It is likely that such a transfer of electrified water occurs not only in clouds, but also in plants.

In particular, it was assumed that watering with positively charged water would stimulate plant germination, while watering with negatively charged water would not.

It should be noted that both of these assumptions have already been confirmed in experiments with corn. So, it has been shown that corn that is watered with positively charged water grows faster than corn that is watered with negatively charged water (Figure 5) [7].

Figure 5. *Maize, sprouting for four weeks. Top left – maize, which was watered with water with a potential of +50 mV; below – maize, which was watered with water with a potential of–50 mV [7].*

Thus, this work is a continuation of the successful experiment with corn (Figure 5) [7], which made it possible to verify the consistency of the stated hypothesis.

It is appropriate to recall here that the ascending movement of water into the interior of plants is traditionally explained by a large pressure gradient between roots and leaves, combined with a capillary effect [9 – 12]. This is quite surprising, because both of these mechanisms cannot lift water to the top of tall trees such as sequoia sempervirens or eucalyptus (Eucalyptus regnans), which can be more than 100 m high [11].

It should be noted that the limited water-lifting capacity of such mechanisms is recognized by some plant physiologists, who "strengthen" them with the hypothesis of the existence

of an unbending water column inside the xylem. Moreover, some authors "help" the movement of water up the xylem with cavitation gas bubbles, which create a lifting force that complements the mentioned pressure gradient and capillary forces [11, 12]. Thus, my assumption of the existence of an electromagnetic force that would solve all these problems remains valid.

It is no less important that the same force makes it possible to explain both the movement of water upward along the xylem and its movement downward along the phloem, which is not typical of the explanations usually offered by plant physiologists [9 – 12].

2. Materials and Methods

Water with a positive electrical potential was obtained in two ways [13]:

(a) By passing through uncharged water of gaseous oxygen.

(b) By filtration of uncharged water through the silica gel.

It is known that gaseous oxygen sorbs electrons from water, and silica gel – hydroxyl ions, OH^- [3].

Water with a negative electric potential was also obtained in two ways [13]:

(a) By passing through uncharged water of gaseous hydrogen.

(b) By filtration of uncharged water through the activated carbon.

It is known that gaseous hydrogen is an electron donor for water, and activated carbon sorbs hydrogen ions from water, H^+ [3].

The electric water potential was measured against uncharged water as shown in Figure 6.

Water with the required electrical potential was obtained in two ways [13]:

(a) By varying the depth of the layer of sorbent through which filtered water is discharged.

(b) Varying the time during which the gas passed through the uncharged water.

The work used different soils and flower pots of different shapes and colors. At the same time, in each experiment, seeds and plants moistened with oppositely charged water were placed side by side. According to our plan, this made it possible to neutralize the influence of unaccounted for factors on the results of the experiments.

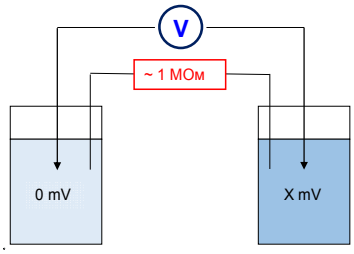

Figure 6. *This is the most convenient setup for measuring the electric potential of water: on the left is a vessel with uncharged water (0 mV), on the right is a vessel with water, the potential of which is determined (X mV) from a voltmeter reading (V).*

3. Results

It was initially found that plants that are watered with even weak positively charged water grow faster than plants that are watered with weak negatively charged water (Figures 7, 8).

Figure 7. *Sunflower growth within four weeks. Left – sunflower, which was watered with water with a potential of –50 mV; right – sunflower, which was watered with water with a potential of +50 mV.*

Both plants grow on the same ground, separated by a piece of cardboard.

Figure 8. *This is how lawn grass looks like on the tenth day after sowing. Top right – grass that was watered with water with a potential of +50 mV; below - grass, which was watered with water with a potential of –50 mV.*

Each container contains 50 grass seeds.

Later it turned out that strongly negatively charged water can completely suppress plant germination (Figures 9, 10).

Figure 9. *Sunflower growth within two weeks. Top left – sunflower, which was watered with water with a potential of +150 mV; bottom right – sunflower, which was watered with water with a potential of –150 mV.*

Water with sufficient negative potential completely suppresses sunflower germination (right).

Figure 10. *Bean growth when watered with charged water for two weeks; beans do not grow absolutely when irrigated with water with a potential of –150 mV (left), but grows well when irrigated with water with a potential of +150 mV (right).*

Water with sufficient negative potential completely inhibits bean sprouting (left).

After all this, the fact that seeds placed in positively charged water germinate faster than seeds placed in negatively charged water (Figure 11) was quite expected.

Figure 11. *Germination of beans wetted with water with a potential of –50 mV (left) and water with a potential of +50 mV (right).*

It was probably also expected that hydroponic plants do not germinate in a downward electrostatic field (Figure 12, left), but germinate in an upward electrostatic field (Figure 12, right).

Figure 12. *Germination of the bulbs within two weeks; onions do not germinate at all in a downward electrostatic field with a voltage of 1 V / cm (left), but grow in an upward electrostatic field with the same voltage of 1 V / cm (right).*

Probably less obvious was the fact that onions placed on a steel plate capable of deflecting downward the horizontal component of the geomagnetic field [14] germinate more slowly than in the control (Figure 13).

Apparently, all this deserves a detailed discussion.

Figure 13. *Germination of onions within three weeks: Onions placed on a steel plate germinate more slowly (left) compared to controls (right).*

It is also noteworthy that a bow placed on a steel plate branches directly above the bulb (left), and the control bow first forms an arrow (right).

4. Discussion

First, it should be noted that all of the results presented are quite useful on their own. Thus, these results provide a better understanding of some phenomena, including those that are considered trivial.

So, given that rain drops acquire a positive charge when rubbed against the air [3], their stimulating effect on plants becomes obvious. The same is true for aeroponic, which necessarily includes spraying the roots, in fact, moistening them with positively charged water. In addition, the same reasons make it possible to characterize reactive oxygen not only as a signaling agent of some metabolic reactions of plants, including germinating ones [15], but also as a factor providing or indicating their positive electrification.

Also, the reason for the stimulating effect on plants of those representatives of the soil microflora that release protons outside the cells [16], and therefore into the ground, become obvious. Thus, creating proton gradients on their own cytoplasmic membranes, these soil microorganisms not only stimulate the activity of their own membrane ATP synthases [16 – 18], but also enrich the soil with uncompensated protons, increasing its fertility due to positive electrification.

The concept of the nature of the stimulating effect of light on plants can also be extended on the basis that the Pointing vector determines not only the direction of light rays, but also the direction of movement of positive charges [19]. This means that well-lit soil and water are more positively charged than poorly lit soil, and, in addition, given the results obtained, explains why plants grow better during the day. In

any case, it is this action of light that makes it possible to explain the germination of a part of plants moistened with negatively charged water (Figures 5, 7, 8). (The positive electrification of the daytime part of the Earth [20] must certainly be taken into account in this case.)

At the same time, the results obtained clearly show that the stimulating effect of anolyte on germinating plants may be due not only to its disinfecting effect on seeds, as is commonly believed [21, 22], but also to its positive charge.

In addition, all the results obtained, with the exception of the one presented in Figure 11, indirectly confirm the participation of the declared electromagnetic force in plant germination, but this action is most directly confirmed by the results presented in Figures 12 and 13, which therefore deserve a separate discussion.

Thus, the results presented in Figure 12 clearly show that an upwardly directed electrostatic field, which enhances the indicated electromagnetic force, stimulates plant germination (Figure 12, right), while a downwardly directed electrostatic field, which counteracts the indicated electromagnetic force, prevents their germination (Figure 12, left). In fact, this is a direct confirmation of the participation of the declared electromagnetic force in plant germination.

Let us make sure that the results presented in Figure 13 no less directly show that the declared electromagnetic force is involved in plant germination. Initially, it should be taken into account that this force arises due to the interaction of the moving earth's surface (together with the plants that are located on it) with the horizontal component of the geomagnetic field [4 – 7]. You should also take into account the inclination of the magnetic field, which is always observed near ferromagnetics, including steel [14]. Thus, the inclination of the horizontal component of the geomagnetic field towards the steel plate causes its weakening (in fact, a partial transformation into the vertical component of the geomagnetic field) [14]. For this reason, both the declared electromagnetic force and its ability to raise water inside the plants and stimulate their germination are weakened (Figure 13, left).

Accordingly, the weakening of the horizontal component of the geomagnetic field in the circumpolar regions of the Earth explains the dwarfism of arctic woody plants, and its inclination towards mountain peaks explains the low growth of alpine plants [23]. Also, the now increased growth of dwarf shrubs in Greenland may be associated not only with an increase in annual temperature [24], but also with an increase in the horizontal component of the geomagnetic field due to the displacement of the north magnetic pole.

While this all seems consistent, it is also necessary to discuss the existence of oppositely directed water flows within plants. Given that the currently proposed explanations for the coexistence of such flows seem to be contradictory [9 – 12], this discussion can be useful.

Thus, it is reasonable to assume that leaves not only provide photosynthesis and heat removal into the environment [11, 12, 25], but also are organs in which water loses its positive charge. Thus, this can occur during the addition of uncompensated H^+-ions to carbonic acid anions contained in humid air:

$$HCO_3^- + H^+ \rightarrow H_2CO_3 \quad (1)$$

Immediately, it should be noted that negatively charged anions of carbonic acid are concentrated on the Earth's surface under the action of the same electromagnetic force as negative charges in clouds (Figure 4).

Thus, CO_2 is fixed in an anionic form, and not in a molecular form, as is commonly believed: $CO_2 + H_2O \rightarrow H_2CO_3$ [11, 12]. In any case, the just proposed mechanism of CO_2 fixation (1) is in good agreement with the fact that extremely positively charged water stimulates photosynthesis, without which the obvious growth of germinating plants would be impossible.

Thus, it can be assumed that the same electromagnetic force supplies the plant leaves with both water and CO_2. Besides, this electromagnetic force can cause annihilation of uncompensated H^+-ions in the leaves. So, the assumption that leaves are organs in which water loses a positive charge seems quite reasonable. It should be noted that this assumption also takes into account the fact that only positively charged water is capable of evaporating under terrestrial conditions [26], naturally, due to its movement relative to the horizontal component of the geomagnetic field [4, 27].

Apparently, all this must be taken into account when explaining the gigantism of terrestrial plants in antiquity. In any case, it is believed that this gigantism was associated not only with the increased CO_2 content in the ancient atmosphere, as it is believed [28, 29]. It is also obvious that all this makes it possible to better understand the heliotropism of plants, the positive electrification of which under the influence of sunlight is absolutely not taken into account. [30, 31].

All these reasons also suggest that the water that moves up the xylem is positively charged, and the water that moves down the phloem [9 – 12] is not charged at least. Thus, the spatial separation of phloem and xylem is no less logical than the spatial separation of ascending and descending streams in the clouds (Figure 4).

It is also noteworthy that the same electromagnetic force clarifies the apparent similarities between celestial electrical discharges, both ascending (Figure 3, above) and descending (Figure 3, below) [4], and corresponding plant parts.

Despite the fact that it does not contradict other results, the result presented in Figure 11 also requires a separate discussion. In fact, this result clearly reflects the fact that the electric potential of water determines its penetrating ability, which is manifested in the different ability of differently electrified water to hydrate starch (Figure 14) [13], which is the main nutrient of germinating plants [11, 12].

Thus, it can be assumed that the low penetrating ability of negatively charged water does not allow it to hydrate starch (Figure 14, left), and the high penetrating ability of positively charged water determines its ability to hydrate starch extremely quickly (Figure 14, right) [13]. Considering the exceptional nutritional value of starch for germinating plants

[11, 12], it was suggested that well-hydrated starch is more rapidly hydrolyzed to glucose, which is transported into cells along proton gradients across the cytoplasmic membranes [11, 16 – 18], which certainly grow with increasing concentration of uncompensated H^+-ions inside plants.

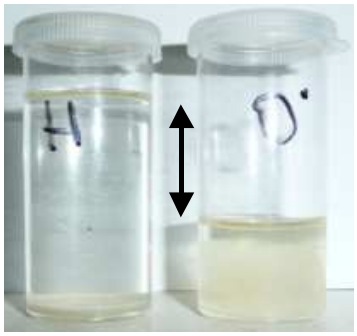

Figure 14. *There is a swelling of starch in water with a different electric potential. Starch does not swell in water with the potential of –250 (left) and swells in water with the potential of +250 mV (right).*

Negatively charged water was produced by bubbling uncharged water with hydrogen gas (left); positively charged water was obtained by bubbling uncharged water with gaseous oxygen (right).

Positively charged water evaporates quickly even from a closed plastic tube: the arrow shows how much the level of such water has decreased during the day. It is noteworthy that salts dissolved in positively charged water penetrate through the plastic along with it.

Both waters used had a temperature of 20 – 22 °C [13].

5. Conclusion

To better understand the effect of electrified water on plants, including their germination, it is advisable to take into account that the penetrating ability of water depends on its electric charge (potential), and also that the electric charge (potential) of water determines its ability to hydrate starch, which is the main nutrient for germinating plants, and hydrolyze it. So, one should take into account the extremely high penetrating ability of positively charged water and its ability to quickly hydrate starch. At the same time, it is necessary to take into account the extremely low penetrating ability of negatively charged water, as well as its complete inability to hydrate starch.

In addition, one should take into account the existence of a powerful earthly electromagnetic force, which affects the circulation of water both in the atmosphere, in particular, inside the clouds, and on the surface of the earth. Especially it should be borne in mind that this force moves positive charges up and negative ones down. The power and widespread distribution of this force suggests its participation in the distribution of water inside plants. This participation is very productive as it makes it easier to understand the water circulation within plants. In particular, this participation allows us to offer a simple explanation of both the stimulating effect of positively charged water and the inhibitory effect of negatively charged water on germinating plants. Also, this participation allows for a more conscious and, therefore, more productive use of artificial electric fields to stimulate plant germination.

Thus, the described combination of both the charge-dependent penetrating ability of water and the action of the electromagnetic force distributing charges can be very promising both for plant physiology and for agriculture. Otherwise, we will have no choice but to agree with Szent-Gyorgyi's verdict: "Biology, perhaps, because until now not successful in understanding the most common functions that focused on the matter in the form of particles, keeping away them from two matrixes: water and electromagnetic fields".

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