

Harnessing Electro – culture farming (E - soil system) for promoting hydroponic system of plant growth

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Introduction

"The most fertile soil does not necessarily produce the most abundant harvest. It is the use we make of our faculties which renders them valuable" - Thomas W. Higginson. Soil is the basis for many crops cultivation and food production. But with the growing population and decreasing agricultural land, it is becoming increasingly difficult to grow crops to achieve satisfactory yields and ensure future food security. To address this issue, we should consider alternative substrates for growing crops, such as vertical farming, rooftop vegetable cultivation, aeroponics, etc. One of the advancements in cultivation is hydroponics. Hydroponics is an advanced method of growing crops or plants using water as a medium. It promotes the growth of crops through root diffusion in a liquid medium. A further development of this technology is E-Soil. E-Soil has the advantage of significantly reducing energy consumption, eliminates the risks associated with high-pressure systems, and ensures continuous plant growth.

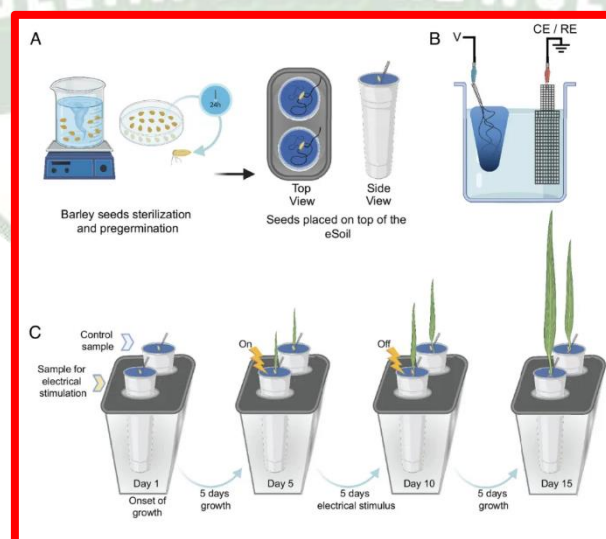


Fig. 1. Diagrammatic representation of Barley seeds growing on the eSoil

Electronic Soil

Eleni Stavrinidou, an associate professor at Linköping University, spearheaded the development of eSoil, or electronic soil, that is commonly referred to as E soil. eSoil is an

electrically conductive hydroponic growing medium developed by the Electronic Plants group at the university's Laboratory of Organic Electronics. It is a potential new soilless gardening technique that may contribute to sustainable urban agriculture and food security. In hydroponic settings, it can aid in accelerating plant growth. By assisting farmers in increasing crop yield, minimizing their environmental effect, and optimizing resource management, it has the potential to enhance climate-smart agriculture systems.

History

Earlier in 1746, French physicist and philosopher Pierre Bertholon de Saint-Lazare are the two scientist were used atmospheric electricity to deliver the electrical current to their garden pots. But after many decades, this type of electrical based farming in soil is upgraded here.



Working status of E soil on recent study

When the roots of barley seedlings were electrically stimulated for 15 days, eSoil increased their growth rate by 50%. The research promotes more efficient and sustainable development while increasing the diversity of hydroponic crops. In hydroponics, plants are grown without soil, requiring only water, nutrients and a substrate - something their roots can attach to. This closed system allows water to circulate, ensuring each seedling gets exactly the nutrients it needs. This means very little water is used and all nutrients remain in the system - something that is not possible in traditional agriculture.





Significance of E soil

The importance of eSoil is highlighted by its capacity to boost plant growth, as demonstrated by research indicating a 50% rise in the growth rate of barley seedlings grown in hydroponic systems utilizing this technology. The combination of hydroponics and eSoil may provide valuable solutions to the world's food needs, particularly in urban areas where available agricultural land is scarce.

Advantages

- **Water and Land Efficient:** For farmers with restricted access to water and land, hydroponic farming technology with closed water loop systems is a good choice.
- **Suitable for Urban Areas:** In urban and semi-urban areas where arable land is contaminated, the need of soilless systems is multiplied.
- **Reduced Resource usage:** A range of stakeholders can embrace this alternative farming method due to its reduced and more effective resource usage.
- **Greater production:** Because there are more plants per square meter in soilless systems, the estimate given by FAO has indicated that production in vegetable are 20 to 25 percent higher when compared towards traditional systems.
- It was more useful in places where cultivation area is less and climatic condition are poor.

Negative impacts

- **Requirement of proper attention and timely change of water:** In this, the water is to be replaced at proper time because when the paper gets replaced, the pathogen entry from the old water is reduced, thus protecting from plant diseases.
- **Intensive water and electricity:** In hydroponics system, the two main factors required are water and electricity. When it was not properly adopted and use, this system of hydroponics won't function well for longer period.

Future Research

Still going with many kinds of research programme, trials etc. Research scholars, Scientist shall focus on E soil level for Next Gen crop production for future food security.

Reference

AlShrouf, A. 2017. Hydroponics, aeroponic and aquaponic as compared with conventional farming. American Scientific Research Journal for Engineering, Technology, and Sciences. 27(1): 247-255.

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