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Singapore's NUS-SCELSE scientists uncover plant hormone that can boost plant growth by 30%

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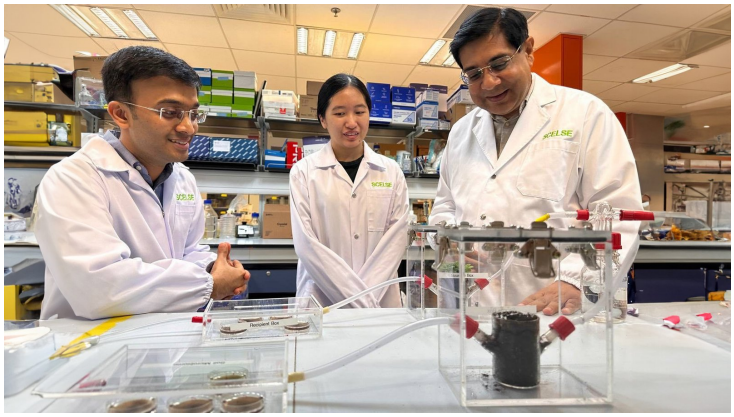
Discovery holds great promise for sustainable food security across diverse soils and crops



Discovery holds great promise for sustainable food security across diverse soils and crops

A study conducted by NUS and the Singapore Center for Environmental Life Sciences Engineering (SCELSE) uncovered the most powerful tool in nature's arsenal for combating agricultural challenges today: agro-microbials, or agro-chemicals of natural origin, that can enhance crop productivity and yield by enhancing synergy between crops and microbes.

In a study conducted over five years from 2018, the scientists discovered that a well-known protective hormone typically released by plants above ground during periods of stress â?? a volatile organic compound (VOC) known as methyl jasmonate (MeJA) â?? possessed a hitherto unknown function. They found that MeJa served as a shared, possibly secret, language that allows the plant to communicate with the surrounding layers of microorganisms embedded in the soil.

The research team has made three important discoveries:

- Using a specially engineered airflow system, scientists have found, for the first time, that MeJA is released underground by the plant roots in a volatile form;
- The presence of volatile MeJA triggers and enhances the formation of biofilms in bacteria situated at a distance from the plant roots; and
- These bacteria in the biofilm release a different set of volatile compounds that can boost plant growth by up to 30%.

Associate Professor Sanjay Swarup, who is a Principal Investigator at the Research Centre on Sustainable Urban Farming (SUrF) under the NUS Faculty of Science and a Deputy Research Director at SCELSE, said, â??The impact of this discovery is manifold and key to sustainable agriculture. Harnessing these agricultural microbes will not only boost crop productivity, but also reduce the need for synthetic inputs and mitigate the environmental impact of modern farming practices.â?

Having discovered natureâ??s own way of communication between plants and beneficial microbes, the research team has filed a patent for the use of this novel application to enhance it to improve the resilience and productivity of agricultural systems. The upshot of this could be a new generation of agro-chemicals or nature-structured chemicals which can be used to enhance the benefits for plants.

Agro-microbials can influence plant growth and address food security.

Agro-microbials â?? and nature-based agrochemicals â?? are now emerging as a promising strategy for sustainable agriculture. Agro-microbials encompass microbial communities associated with crops, and they serve critical functions of plant growth promotion, disease prevention, and nitrogen fixation. They also help to keep the soil fertile by breaking down organic matter, recycling nutrients, and creating humus to retain moisture. Diverse communities of agro-microbials can be found inside biofilms, where they are embedded in a self-produced matrix.