PLANTS & HERBS

Tiny Needle-like Sensors Inserted into Plants are the Latest Addition to Precision Agriculture

By bestfolkmedicine · 09/07/2021 · 3 min read



What if we were able to closely track plants' health, similarly to when we use a monitor to track our heartbeat?

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According to researchers, they're closer to achieving this goal by using a microsensor that can be inserted into stems and leaves of crops to monitor their health and productivity.

One of the newest innovations to precision agriculture, this field of research and tech development has a goal to collect as much data as possible to enable optimal growing conditions for different plants.

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Is Precision Agriculture the Future?

Precision agriculture is achieved using techs like soil sensors and camera-fitted drones.

Collecting this data helps boost the efficiency of fertilizers and water and helps reduce waste, emissions, and pollution.

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By discovering what the crops need, precision agriculture could help boost the yield and maximize land use and reduce agricultural expansion, one of the major threats to the habitat in the wild and one of the reasons for climate change.

The Tiny Needle Structures Are a Potent Addition to Precision Agriculture

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According to the research team, these new sensors (tiny needle-like structures made from polymer that are inserted into plants) may be a potent addition to the toolbox of precision agriculture.

Interestingly, this is isn't the first time that scientists have made such sensors. Microneedles are a tech borrowed from medicine and applied in the world of agriculture.

These tiny needles, in plants, can be used to transmit an electrical current and measure bioimpedance.

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This will reveal important data about the plant's health by how it responds to the flow of the current as the reactions change depending on several factors, including nutrients, light, and water availability.

What Was the Biggest Challenge in Precision Agriculture?

In the past, it wasn't easy to make thin-enough needles that would pierce the plant's skin without causing long-term damage. Moreover, the production has also been too expensive and not efficient enough to produce sensors on an industrial scale.

The researchers in the new study managed to find a solution to these obstacles.

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They made silicon molds and found that if submerged in chloroform liquid solution, the silicon expands ever so slightly and gently eases the needles out.

This gentle release method is sensitive enough to make fragile, thinner, and less damaging needles.

Moreover, the molds can be used up to 20 times over and lower the production costs. The ease of production is also likelier to get these needles manufactured on a larger scale and potentially entering the field.

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The Researchers Tested the Tiny Needles in Real Life

The researchers made several experiments to try out the needles on thale cress plants. Namely, they punctured the plant stems and leaves using the needles and then used them to conduct a current into the plant.

They exposed it to several water and light conditions.

The end results show them that the bioimpedance measures changed depending on the amount of light and water the plants got, pointing out that the sensors may help detect dehydration and overheating in plants.

What's more, the experiments showed that the needles didn't cause any long-term damage to the plants. The almost invisible punctures healed within four days.

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Sources:

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