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Singapore develops first nanotube sensors to detect and distinguish phytohormones

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A group of researchers from Singaporeâ??s Disruptive & Sustainable Technologies for Agricultural Precision (DiSTAP) have developed the first ever nanosensor that can detect and distinguish gibberellins (GAs), a class of plant growth hormones.

These sensors could prove transformative for agriculture and plant biotechnology by monitoring early-stage plant stress, assisting farmers in precision agriculture and crop management to enhance yields.

Disruptive & Sustainable Technologies for Agricultural Precision (DiSTAP), a Interdisciplinary Research Group (IRG) of Singapore-MIT Alliance for Research and Technology (SMART) is an MITâ??s research enterprise in Singapore. DiSTAP has collaborated with Temasek Life Sciences Laboratory (TLL) to develop nondestructive nanosensors proven viable on living plants.Â

Gibberellins diterpenoid phytohormones modulate plant growth and developmental processes. The new nanosensors developed by the SMART researchers assists in study of GA dynamics in plants under salinity stress at a very early stage, potentially enabling farmers to make early interventions when eventually applied in the field. This forms the basis of early-stage stress detection.

The near-infrared (NIR) fluorescent carbon nanotube sensor is capable of detecting and distinguishing two plant hormones, GA3 and GA4, belonging to a class of plant hormones known as gibberellins (GAs).

Current practiced methods to detect GA3 and GA4 typically require mass spectroscopy-based analysis, a time-consuming and destructive process. In contrast, the new sensors developed by the researchers are highly selective for the respective GAs and offer real-time, in vivo monitoring of changes in GA levels across a broad range of plant species.Â Further gibberellins studies can yield breakthroughs agricultural innovations and contribute to food security.