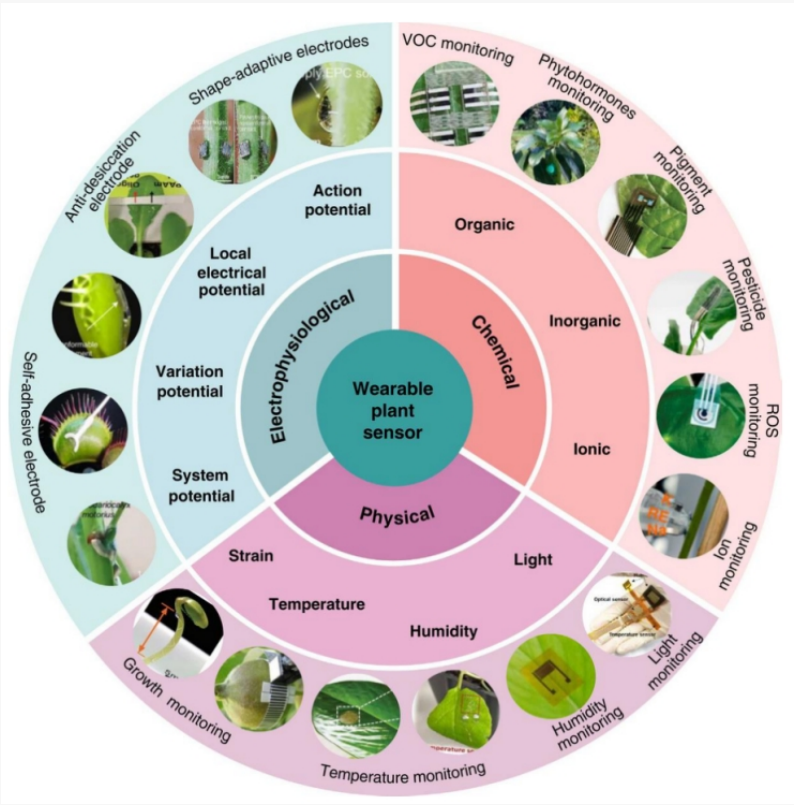
# Wearable plant sensors devices for precision agriculture and environmental monitoring

FAYETTEVILLE, GA, UNITED STATES, May 13, 2025 /EINPresswire.com/ -- This review summarizes the research progress on flexible wearable sensors based on different plant signals and classifies them according to their functions: physical sensors, chemical sensors and electrophysiological sensors. Furthermore, the challenges currently faced by wearable plant sensors are presented and we propose a design framework for next-generation plant wearable sensors enabling continuous real-time plant health monitoring under field conditions.




Plant wearable sensors for microenvironment and health monitoring.

Around 700 million people worldwide still face food shortages. To address the rising threat of population growth, cultivated land reduction and environmental degradation, there is an urgent need to develop intelligent plant monitoring system to ensure healthy crop growth. In a review article published in the KeAi journal Wearable Electronics, a team of researchers from China summarizes the recent progress in wearable plant sensing devices for intelligent agricultural monitoring system.

“Plants produce a variety of signals that can reflect their health status under stress. To accurately obtain the health signals of plants, wearable sensors need to be used for in-situ monitoring,” explains co-corresponding author Feilong Zhang, professor in flexible sensor for plant health monitoring at Technical Institute of Physics and Chemistry at the Chinese Academy of Sciences. “Wearable sensors can be closely attached to the plant surface to monitor the plant growth rate, leaf surface temperature and humidity, organic volatiles released, and electrophysiological signals in real time.”

The team systematically summaried the current status and recent research progress of wearable sensor devices for plant monitoring. Wearable plant sensors are categorized based on their detected signals: physical signals (growth deformation, light, humidity, temperature), chemical signals (gases, pesticide residues, ion changes), and electrophysiological signals. An overview of the constituent materials, fabrication methods, and sensing mechanisms corresponding to these signals is provided in this review. Additionally, the challenges and development trends of flexible wearable plant sensors are discussed, including issues related to sensor attachment, gas exchange and device interference on complex surfaces.

“While challenges remain, ongoing innovation and cross-disciplinary collaboration are paving the way for wearable sensors to become vital tools in precision agriculture and ecological monitoring — supporting smarter, more sustainable farming systems,” says Zhang.

References
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