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REVIEW ARTICLE

Electrochemical Sensors for Detection of Phytomolecules: A Mechanistic Approach

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Abstract: High demand and ongoing technological advancements have created a market for sensors that is both varied and rapidly evolving. Bioactive compounds are separated systematically to conduct an in-depth investigation, allowing for the profiling or fingerprinting of different Plantae kingdoms. The profiling field is significant in elucidating the complex interplay of plant traits, attributes, and environmental factors. Flexible technology advancements have enabled the creation of highly sensitive sensors for the non-destructive detection of molecules. Additionally, very specialized integrated systems that will allow multiplexed detection by integrating many hybrid approaches have been developed, but these systems are highly laborious and expensive. Electrochemical sensors, on the other hand, are a viable option because of their ability to accomplish exact compound detection *via* efficient signal transduction. However, this has not been investigated because of some obstacles to learning minimum metabolites' fundamentals and non-redox properties. This article reviews the electrochemical basis of plants, contrasting it with more conventional techniques and offering both positive and negative perspectives on the topic. Because few studies have been devoted to the concept of merging the domains, we've expanded the scope of this work by including pertinent non-phytochemical reports for better report comparison.

Keywords: Phytochemicals, sensors, herbs, signaling, fingerprinting, electrochemical profiling.

1. INTRODUCTION

According to the standard approach of classifying living things as either "uni" or "multicellular," plants are classified as eukaryotic multicellular species. Because of their ability to act as a source of nutrients and other helpful chemicals, they play a crucial function in the natural world. They are essential for the survival of many different forms of life. Plant products are the source of nutrition for various social classes and housing, fuel, and countless by-products. Soil, water, weed control, and nutrient analysis sensors are some of the most common applications of sensor technology in farming [1-8].

. The platforms' primary focus is not on the plants but the environmental variables that affect them [9].

Plants, like neurons, use signals to communicate with one another, and these signals form the basis for cutting-edge technologies like sensors and the cloud. In this case, the goal is to understand the signals and use that data in agriculture and botany. These elements of the surrounding environment are commonly used as surrogates for measuring plant health. Because of this, it's essential to keep an eye on plants at all development phases to ensure they're producing healthy food. This article uses plant profiling to learn about plants' fundamentals rather than their environments. Using plant-based sensor technology, we can learn a wide range of information essential to improving agricultural yields.

When plants are under attack from the outside world, their systems respond by secreting a wide range of defense chemicals (Fig. **1**).

Differences in signaling suggest that oxidative stress causes changes in molecules involved in defensive systems (polyphenols and terpenes). These shifts were believed to result from chemical messages sent between plants via volatile organic molecules.

We present a straightforward approach for 'taxa' traits to infer evolutionary links and electrochemically profile plants. Different methods, including some that don't rely on electrochemistry, are considered in this review. Fig. (**2**) provides a

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