

GreenTap - A Method for Stimulating Production and Extraction of Metabolites in Plants

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Overview

Numerous plant-originated compounds with unique properties are widely used for diverse applications in the drugs, food, and cosmetics industries. Chemical synthesis of these compounds is not feasible due to their complexity, and harvesting said compounds from plants can be extremely challenging and inefficient. The lab of Prof. Asaph Aharoni has developed a method for simple extraction of plant metabolites, which does not damage the plant or interferes with the formation of these compounds. The system can be used to induce and extract plant metabolites as well as to identify novel plant metabolites.

Background and Unmet Need

Numerous plant-originated compounds with unique properties are widely used for diverse applications ranging from therapeutics, fungicides, insecticides, natural flavoring, colorants, scents, and natural oils. Chemical synthesis of these compounds is not feasible due to a variety of factors. Harvesting these compounds requires significant amounts of resources and time to grow the plants, resulting in relatively low amounts of the desired compounds per plant. Importantly, 70% of a plant's root metabolites are exuded into the soil, making them difficult to collect. Systems such as hydroponics and aeroponics are simpler to extract from, however, features of the soil such as phytohormones and the microbiome have an important effect on plant metabolism and exudate formation. Therefore, methods for simple extraction of plant metabolites, which do not hamper the formation of these compounds or damage the plant, are needed.

The Solution

The group of Prof. Asaph Aharoni has developed a method of inducing metabolite production in plants and efficiently extracting them.

Technology Essence

The method devised by Prof. Aharoni and his team consists of splitting a plant's root into two moieties, one in grown in soil and the other in a separate hydroponic or aeroponic container. Each root is then applied with a stimulant (e.g. a microbe, fungus, insect, pre-defined chemicals, etc.). Alternatively, the plant can be administered with a stimulant, depending on the type of stimulant used and/or expected exudate. Each container can be equipped with a sensor that tracks growth conditions and the exudate of interest. Finally, the container is fitted with an absorbent designed to capture the specific exudate or extract of interest.

Advantages and Applications

- A method for increasing production of plant bioactive metabolites
- A method for identifying novel plant metabolites
- The system can be continuously optimized

Development Status

The system has been tested with numerous plant species to produce and collect a number of metabolites, including alkaloids in tomato plants, taxol and other taxanes in *Taxus baccata*, and vinca alkaloids in *Catharanthus roseus*.

Patent Status

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