

Crop roots-targeted delivery of nutrients and therapeutics using a biodegradable device

Background

Typical crop management practices result in the over application of fertilizers and therapeutics over the crop's growing cycle, which is an inefficient use of chemicals that increases production costs and causes harmful effects on the environment. The University of Waterloo's biodegradable device can be specifically engineered for controlled release of a variety of classes of active ingredients over an extended period of time directly to the plant root system.

Description of the invention

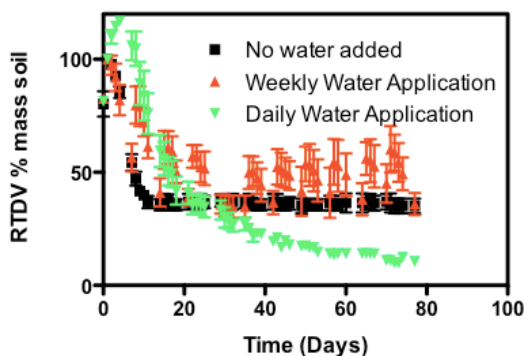
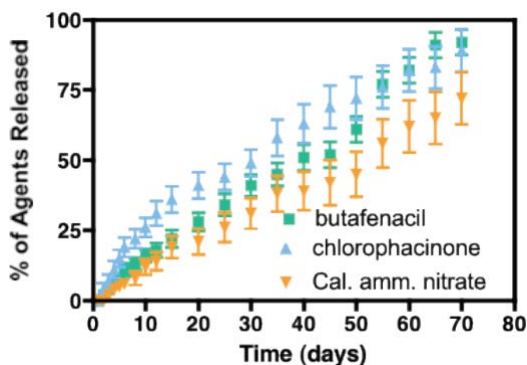
The invention describes a biodegradable device that can encapsulate small molecules and bio-macromolecules while simultaneously allowing for slow release of these molecular payloads to the plant's root system at a sustained rate for multiple months. This technology offers the following key features: 1) more cost effective targeting and release of soil additives, 2) a predictable and prolonged sustained release of soil additives (up to several months depending on the application) thereby minimizing the need for repeated applications, 3) the ability to store water from the soil and to slow release in dry/drought growing conditions, and 4) the device is biodegradable and thus environmentally compatible.

Advantages

The device enables a controlled "just-in-time" cost efficient delivery of nutrients, therapeutics, and water to plant roots in a significantly better environmentally sustainable way. Furthermore, encapsulation of active ingredients within the device can protect the ingredients from degradation (light, temperature, and moisture) during storage and thereby extending the product shelf-life.

Potential applications

Soil additives which can be delivered include: fertilizers, micronutrients, vitamins, herbicides, pesticides, and fungicides. Additionally the device can be engineered as a water "refillable" vehicle to provide more sustained moisture to root systems in dry or drought growing conditions. Proprietary use of this device with recent off-patent soil additives may represent a strategic opportunity to extend revenue returns from the significant investment in developing such additives.



Reference

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Patent status

Patent applications filed in U.S.,
Canada, Europe, China, and India

Stage of development

Prototype and validation

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