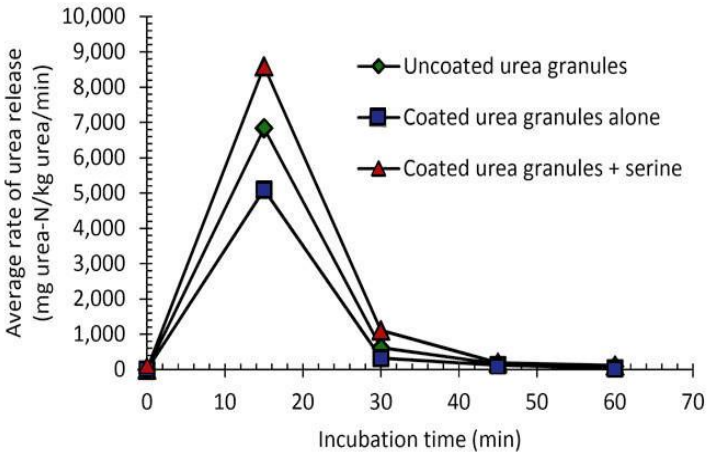
Carleton University

ROOT EXUDATE-ACTIVATED SYSTEM FOR AGROCHEMICAL DELIVERY

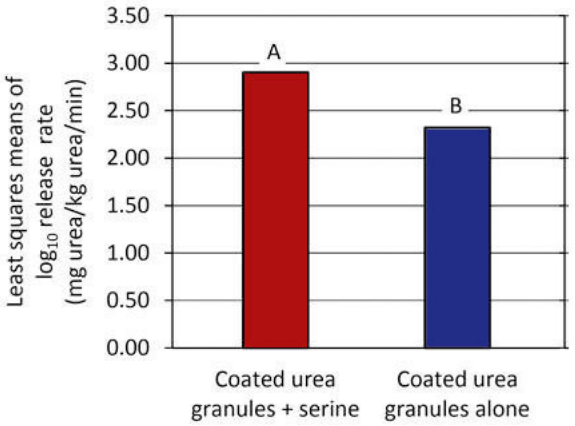
Technology Overview

- Nanofertilizer particles consisting of
  - a coating, such as a cellulose derivative or a fatty acid, and
  - a DNA aptamer that binds specifically to root exudates produced when the plant is actively taking up nutrients from the soil.
- The permeability of the coating increases when the coated particles are exposed to the root exudate.



Comparison of urea release rates over time for coated and uncoated fertilizers. Green: Uncoated fertilizer; Blue: Fertilizer with aptamer-containing coating in the absence of any target in sand; Red: Fertilizer with aptamer-containing coating in the presence of the target molecule serine in sand.

Bar graph comparing urea nitrogen release rate. Blue: Fertilizer with aptamer-containing coating in the absence of any target in sand; Red: Fertilizer with aptamer-containing coating in the presence of the target molecule serine in sand. Statistically significant differences between data are indicated by different letters (A, B).



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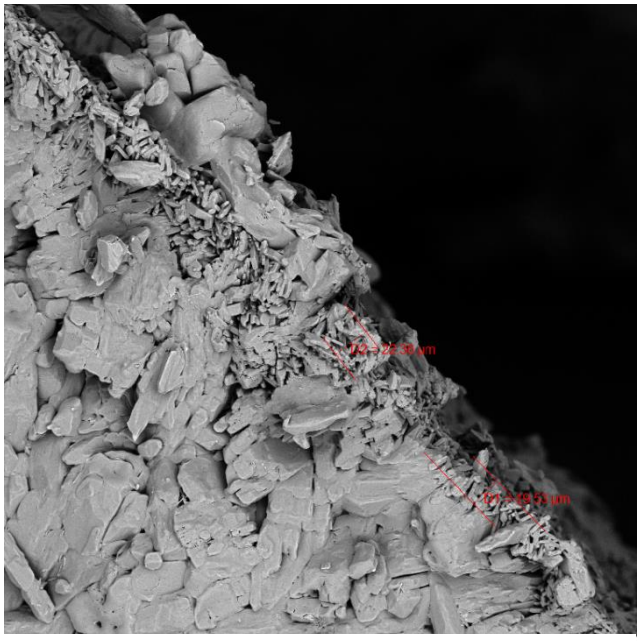
Benefits

- Nutrient release from the coated fertilizer particles is synchronized with uptake of the nutrients by the plant during active growth.
- Advantages of the system include: improved nitrogen use efficiency by the plant, improved crop productivity, and/or reduced leaching of fertilizer from the soil.



SEM micrograph (400x) depicting a cross-section of urea granule coated by a film of polymer of ethyl cellulose and aptamer-61.

Patent-pending Technology

ROOT EXUDATE-ACTIVATED SYSTEM FOR AGROCHEMICAL DELIVERY

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- US application 17/276,302 (int'l filing date 16-Sept-2019)
- CA application 3,112,597 (int'l filing date 16-Sept-2019)
- AU application 2019337776 (int'l filing date 16-Sept-2019)

For more information about licensing opportunities and research collaborations, contact

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