Modified Biopolymer Derived from *Rhizobium tropici* as an Alternative to Petroleum-based Polymers for Soil Modification, ESTCP ER-0920

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### Problem Statement
- Soil strengthening and stabilizing additives are used for erosion control in areas where vegetation and geotextiles are inappropriate, such as SAFRs, and for dust control in areas where high winds and pressure pulses (natural or artificial) produce dust in quantities that reduce visibility (gun positions, rotary wing landing areas). Heavy metal transport off ranges is a concern with both water and air erosion of soil and requires extensive range maintenance to control. Metals and heavy dust are a health concern for troops.
- Synthetic, petroleum-based polymers are currently used on training ranges for erosion control and dust abatement. These compounds are based on an increasingly expensive and scarce natural resource and they are often difficult to apply. Their use also has an increasingly negative public perception due to their limited biodegradability and chemical nature.

### Soil Engineering
The addition of *R. tropici* EPS to soil decreased the soil hydraulic conductivity and increased the compressive strength of the soil.

### Biopolymer Structure
- Both synthetic and biopolymers have a “primary structure” of repetitive monomeric units.
- **Synthetic polymers** are simpler with a less varied structure.
- **Biopolymers**: have a more complex structure
  1. Foldings and crosslinkages change shape and chemical properties
  2. Complex pendant moieties display highly specific functionalities.

### Biopolymer Production
The production modification that produces a stable biopolymer salt for field use is illustrated below. The biopolymer is produced using a continuously stirred reactor.

### References


### Contact Information
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