Modification of Biopolymers from *Geobacillus* sp. strain EP1 for 3D printing Biofertilizer Encapsulation

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Sustainable production of biofertilizers offers an environmentally friendly alternative to chemical fertilizers, mitigating runoff and reducing industrial production. Here, we propose a method utilizing a consortium of microbes directly placed in soil, facilitated by hydrophobic, heat-resistant, and biodegradable capsules. Previous research highlights the thermophilic bacterium *Geobacillus* sp. strain WSUCF1's capacity to sustainably produce exopolysaccharides (EPSs), rich in glucomannan and mannan, with high thermal stability and low crystallinity. An adapted version of strain WSUCF1, the *Geobacillus* sp. strain EP1, tailored for growth on corn stover, yields abundant biopolymers. By elucidating the structure and bonds of these biopolymers, sustainable methods for enhancing crystallinity and hydrophobicity can be explored. These modified biopolymers show promise as 3D printing materials for biofertilizer capsules, offering innovative solutions for sustainable agriculture.

Keywords: Biopolymer, Biofertilizer, Exopolysaccharides, Sustainability