

Paper for the Planet: Development of a Novel Paper Inoculated With Wildflower Seed and Carbon-Sequestering Fungi

Kruse, Naomi (School: Schullandheim Homeschool)

Background Natural carbon capture is crucial to reduce carbon emissions. While plants store carbon, satellite data exhibits that underground fungal networks capture 36% of carbon emissions. I investigated germinating seeds and mycelium grown on a handmade cellulose-based paper to deliver to disturbed landscapes. **Method** Slurries of cellulose were created using *Pleurotus ostreatus* wildflower seeds at 1g/L. The pulp was pressed, molded, and dried into paper. Propagation Paper was re-wet, kept at a constant temperature of 20°C and neutral pH under various conditions: humidity, aeration, light, and placed in a growth chamber. Seed germination and mycelium growth evaluated every other day for a month. **Analysis** Mycelia Measure is a computer-generated way of measuring mycelial growth. By applying Otsu's method and grayscale thresholding, our program processed heart-shaped images to quantify mycelium growth, yielding accurate results compared to manual calculations. **Results** Pasteurized cellulose plus *Pleurotus* spawn, hand stirred at 70rpm produced the ideal pulp. Low levels of *Pleurotus* spawn in light with adequate aeration proved a higher yield of seed germination. Spawn left in darkness with less aeration led to greater mycelial growth. 45% humidity benefitted both plant and spore. **Conclusion** Planting the paper on low-nutrient soil was positive as spores and seeds naturally germinated where conditions are less managed but more selective to growth than within a lab setting. This work has implications for planting mycelium/seed paper as land remediation and as a carbon credit source, possibly optimizing space regolith, and as a food source on the International Space Station.