

J.DeSimone, S.S. Reinsch, Z. Myers, , J.L. Freeman, M. Steele, G-S. Sun, D. Heathcote,

Ground testing of the EMCS seed cassette for biocompatibility with the cellular slime mold, *Dictyostelium discoideum*

The European Modular Cultivation System, EMCS, was developed by ESA for plant experiments. To expand the use of flight verified hardware for various model organisms, we performed ground experiments to determine whether ARC EMCS Seed Cassettes could be adapted for use with cellular slime mold for future space flight experiments. *Dictyostelium* is a cellular slime mold that can exist both as a single-celled independent organism and as a part of a multicellular colony which functions as a unit (pseudoplasmodium). Under certain stress conditions, individual amoebae will aggregate to form multicellular structures. Developmental pathways are very similar to those found in Eukaryotic organisms, making this a uniquely interesting organism for use in genetic studies. *Dictyostelium* has been used as a genetic model organism for prior space flight experiments. Due to the formation of spores that are resistant to unfavorable conditions such as desiccation, *Dictyostelium* is also a good candidate for use in the EMCS Seed Cassettes. The growth substratum in the cassettes is a gridded polyether sulfone (PES) membrane. A blotter beneath the PES membranes contains dried growth medium. The goals of this study were to (1) verify that *Dictyostelium* are capable of normal growth and development on PES membranes, (2) develop a method for dehydration of *Dictyostelium* spores with successful recovery and development after rehydration, and (3) successful mock rehydration experiments in cassettes. Our results show normal developmental progression in two strains of *Dictyostelium discoideum* on PES membranes with a bacterial food source. We have successfully performed a mock rehydration of spores with developmental progression from aggregation to slug formation, and production of morphologically normal spores within 9 days of rehydration. Our results indicate that experiments on the ISS using the slime mold, *Dictyostelium discoideum* could potentially be performed in the flight verified hardware of the EMCS ARC Seed Cassettes.