NASA STTR 2017 Phase I Solicitation

T7.02 Space Exploration Plant Growth

Lead Center: KSC

Participating Center(s): JSC

Technology Area: TA7 Human Exploration Destination Systems

Producing food for crew consumption is an important goal for achieving Earth independence and reducing the logistics associated with future exploration missions. NASA seeks innovative technologies to enable plant growth systems for food production for in-space and planetary exploration missions.

Nutrient Recycling

NASA seeks technologies that would enable generation and use of essential nutrients for plant growth (P, N, K) that would otherwise have to be provided by time release fertilizers shipped from Earth. Separation of targeted useful nutrients or sequestration of sodium from solution to leave useful nutrients are both desired. Sources of nutrients could include urine, urine that has been pretreated with strong acids or oxidizers, waste biomass from the inedible portions of plants, other spacecraft wastes, or possibly planetary surface regolith.

Cultivation and Growth Systems

Spacecraft systems are constrained to utilize minimal volume and require minimal crew time for management and operation. NASA seeks innovative systems for plant growth and cultivation that are volume efficient, flexible for a range of plant types and sizes (examples: tomatoes, wheat, beans, potatoes), are adaptive for the entire life cycle (from anchoring the seed, managing the plant growth from seedling through harvest), and is reusable across multiple harvests. Concepts need to address integration with watering and nutrient/fertilizer systems (whether soil/media based, hydroponic, or aeroponic). Systems should address whether they are microgravity compatible, surface gravity compatible, or both.

Greenhouse Films

NASA seeks new materials that are flexible, transparent to light used by plants, and survive pressurization. They need to survive the challenges of a Mars surface environment, such as UV, temperature extremes, and exterior particulate and dust damage and accumulation.