



## NASA SBIR 2018 Phase I Solicitation

### H12.04 Wash System to Disinfect Fresh Fruit & Vegetables Grown in Spaceflight

Lead Center: JSC

Participating Center(s): KSC

Technology Area: TA6 Human Health, Life Support and Habitation Systems

Fresh fruits and vegetables grown in spaceflight may provide critical nutritional and behavioral benefits, but introduce unacceptable microbiological risk that could lead to foodborne illness. It is critical that a produce disinfection method be identified to prevent foodborne illness. A water wash method would impact vehicle design, and requirements must be determined in time to inform transit vehicle designs. The Pro-San wipes currently used to disinfect space-grown produce require continual up-mass and create trash. Other novel methods that have been investigated, including hydrogen peroxide and cold plasma chambers, generated a noticeable quality reduction during disinfection. Crewmembers will be harvesting and processing produce themselves, and it is imperative that quality is not reduced during disinfection. Some examples of items of interest:

- Development of a water wash system that can directly integrate in a closed loop with the spacecraft water system.
- Use of food grade sanitizers. No soaps or detergents. Residuals should not exceed approved food amounts.
- Systems that disinfect and dry a range of fruit and vegetable amounts (0.25 - 2 kg) and types (leafy greens, tomatoes, radishes, green peppers) in both microgravity and reduced gravity environments.
- Proposals that use the least amount of crew time (both active and passive) will be given greater consideration.
- Proposals that use the least amount of water for both disinfecting and rinsing will be given greater consideration. Note, crew currently receive less than 3 L of water a day each for consumption.
- Demonstrate greater than a 3 log reduction in Aerobic Plate Count, Yeast and Mold, and both *Bacillus cereus* ATCC 14579, a common contaminant on fresh produce, and in *Escherichia coli* ATCC 11775, a non-pathogen used as a surrogate for other gram negative organisms that have been associated with foodborne illness.
- Demonstrate that produce quality is not noticeably reduced from the beginning of the process to the end.
- Systems that are lowest in mass, power, volume, crew time, etc. will be given greater consideration.
- Reliability; capable of operation for up to 2-5 years and withstand launch loads and gravity changes.

Proposals for novel approaches or systems other than a water solution wash system that meet the success criteria may be considered. Note, systems that require pressurized gases or that generate toxic byproducts will not be considered at this time.

Phase I Deliverables - Prototype system design and evaluation. Final report detailing resource use (crew time, water, mass, volume), sanitizer compatibility, microbial reduction achieved and initial quality results.

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Phase II Deliverables - Completed first generation unit that integrates with the ECLSS water system and detailed data regarding resource use, microbial testing, and quality evaluations.