Fiscal Year:	FY 2021	**Task Last Updated:**	FY 09/23/2020
PI Name:	Oubre, Cherie Ph.D.		
Project Title:	Culture-based Environmental Monitoring of Crop-based Space Food Systems		
Division Name:	Human Research		
Program/Discipline:			
Program/Discipline--Element/Subdiscipline:			
Joint Agency Name:		**TechPort:**	No
Human Research Program Elements:	(1) **HHC**:Human Health Countermeasures		
Human Research Program Risks:	(1) **Microhost**:Risk of Adverse Health Effects Due to Host-Microorganism Interactions		
Space Biology Element:	None		
Space Biology Cross-Element Discipline:	None		
Space Biology Special Category:	None		
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City:	Houston	**State:**	TX
Zip Code:	77058	**Congressional District:**	36
Comments:			
Project Type:	FLIGHT	**Solicitation / Funding Source:**	Directed Research
Start Date:	12/17/2018	**End Date:**	09/30/2022
No. of Post Docs:		**No. of PhD Degrees:**	
No. of PhD Candidates:		**No. of Master' Degrees:**	
No. of Master's Candidates:		**No. of Bachelor's Degrees:**	
No. of Bachelor's Candidates:		**Monitoring Center:**	NASA JSC
Contact Monitor:	Stenger, Michael	**Contact Phone:**	281-483-1311
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Flight Program:	ISS		
Flight Assignment:	NOTE: End date changed to 9/30/2022 per PI (Ed., 10/8/21)		
Key Personnel Changes/Previous PI:	September 2020 report: Tanner Hamilton was added as co-investigator because of his expertise in processing microbiology surface samples returned from spaceflight.		
COI Name (Institution):	Ott, Mark Ph.D. (NASA Johnson Space Center) Castro, Victoria B.S. (KBR/NASA Johnson Space Center) Hamilton, Tanner B.S. (JES Tech/NASA Johnson Space Center)		
Grant/Contract No.:	Directed Research		
Performance Goal No.:			
Performance Goal Text:			

Task Description:	The objective of the Culture-based Environmental Monitoring of Crop-based Space Food Systems (Veggie Monitoring) investigation is to characterize the microbial community of the Veggie plant production system. This baseline of microorganisms is used to develop microbial requirements for spaceflight-grown produce, and provide inputs to future plant system design. Future work will continue to evaluate the microorganisms that colonize the plant growth system using next generation monitoring technologies to develop future methods for evaluation of produce safety. Of note, the data collected in this study may be used to develop a better understanding of the sources of plant system contamination from the International Space Station (ISS) environment, preflight hardware configuration, water/nutrient supply, plant growth matrix, and the seeds cultivated in the investigation. Twelve surface sampling sessions are required. For each session, four bacterial and fungal samples are collected from locations within the Veggie facility. The samples are collected during flight, and visual enumeration is performed approximately five days post-sampling. The samples are then returned to Earth for culture-based processing and microbe identification. The Veggie hardware surface samples are analyzed, and the microbial data is compared to samples from ISS operational surfaces and the nominal potable water supply.
Rationale for HRP Directed Research:	The MicroHost research plan includes microbial evaluations of food systems and recommendations for spaceflight grown food requirements. Baseline microbial monitoring of the food systems will provide needed data for the development of the microbial requirements. This work can be considered as “highly constrained” since it takes advantage of the operational microbial sampling procedure that is already conducted monthly onboard the ISS, by adding swabbing of the hardware and growing plants and collection of water samples, identical in nature and taken at the same time as the operational sample collections. The highly applied and operational nature of this work makes solicitation or awarding to an external entity not feasible. The MicroHost and Food PRRs (Path to Risk Reduction) identify this work as starting in FY19, and it is preceded by the ground study “Produce Microbiology” (Principal Investigator R. Wheeler) which is underway at Kennedy Space Center and will be completed by the end of FY18, and a Microbial Risk Assessment study initiated in Early FY19. The findings from the characterization of the Veggie system will feed into the Microbial Risk Assessment effort and into the Microbial Requirements Development task, planned to begin in FY20.
Research Impact/Earth Benefits:	Successful production of safe, nutritious food in the challenging conditions in space may contribute to improved food production in harsh and remote environments on Earth.
Task Progress:	Crewmembers collected a total of 8 surface samples for bacterial and fungal analysis from various sample sites on the exterior surface of the Veggie unit using the Surface Sampling Kit (SSK). Samples were returned to Earth to the NASA Johnson Space Center (JSC) Microbiology lab via Soyuz 59, where they are enumerated and examined for microbial growth. If growth is observed, each morphologically distinct colony is subcultured and isolated onto a respective medium for identification. Microorganisms are identified via methods including microscopy, biochemical analysis, and molecular sequencing of DNA according to JSC Microbiology policy, procedures, and practices.
Bibliography Type:	Description: (Last Updated:)