

Fiscal Year:	FY 2018	Task Last Updated:	FY 02/13/2019
PI Name:	Zhang, Ye M.D., Ph.D.		
Project Title:	Effect of Simulated Solar Particle Events and Galactic Cosmic Rays on Crop Growth and Development		
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:	None		
Space Biology Element:	None		
Space Biology Cross-Element Discipline:	None		
Space Biology Special Category:	None		
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Organization Name:	NASA Kennedy Space Center		
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Zip Code:	32955	Congressional District:	8
Comments:			
Project Type:	GROUND	Solicitation / Funding Source:	2017 HERO 80JSC017N0001-Crew Health and Performance (FLAGSHIP1, OMNIBUS). Appendix A-Flagship1, Appendix B-Omnibus
Start Date:	10/01/2018	End Date:	09/30/2020
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
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Flight Program:			
Flight Assignment:	NOTE: Change to period of performance of 10/1/2018-9/30/2020 per PI (previously 6/12/2018-9/30/2019 per HRP)--Ed., 3/14/2019		
Key Personnel Changes/Previous PI:			
COI Name (Institution):	Douglas, Grace Ph.D. (NASA Johnson Space Center) Feiveson, Alan Ph.D. (NASA Johnson Space Center) Massa, Gioia Ph.D. (NASA Kennedy Space Center) Plante, Ianik Ph.D. (KBRWyle/NASA Johnson Space Center)		
Grant/Contract No.:	Internal Project		
Performance Goal No.:			
Performance Goal Text:			

Task Description:	With the renewed goal of crewed Mars exploration, continuous fresh food production during long-term deep space missions may be a critical addition to the processed food system to meet astronauts' nutritional requirements and to provide a psychological countermeasure for crew in the isolation and confinement of deep space. However, critical knowledge gaps, such as the impact of deep space radiation on plant crops, must be addressed prior to dependence on crop systems for any portion of a deep space food system. Although the biological impact of simulated space radiation on mammalian cells and rodents has been investigated extensively, the effects of long-term exposure to deep space radiation on crop seeds and plant growth has yet to be characterized. We must investigate the impact of deep space radiation on crop foods to either confirm that nutritious and high quality produce can be reliably grown in deep space or to provide a baseline to guide future radiation countermeasure development for crop foods. We propose to investigate the effect of simulated Solar Particle Events (SPEs) and Galactic Cosmic Rays (GCRs) on several model crops at different growing stages using the NASA Space Radiation Laboratory (NSRL) at Brookhaven National Lab (BNL). The selected crops have been grown successfully under spaceflight-like conditions (temperature, air, humidity, lighting, etc.) in ground analogs, and either have been or will be grown on International Space Station (ISS) for crew consumption. The additional knowledge of the response of each crop to deep space radiation will help identify candidate traits for successful growth on deep space vehicles. The effect of the simulated space radiation environment on crop seeds viability, seedling development, and the impact on nutritional value of fresh produce will be determined.
Rationale for HRP Directed Research:	
Research Impact/Earth Benefits:	
Task Progress:	New project for FY2018.
Bibliography Type:	Description: (Last Updated: 01/08/2024)