Fiscal Year:	FY 2017	**Task Last Updated:**	FY 08/09/2016
PI Name:	Perera, Imara Y Ph.D.		
Project Title:	Transcriptional and Post Transcriptional Regulation of Seedling Development in Microgravity		
Division Name:	Space Biology		
Program/Discipline:			
Program/Discipline--Element/Subdiscipline:			
Joint Agency Name:		**TechPort:**	No
Human Research Program Elements:	None		
Human Research Program Risks:	None		
Space Biology Element:	(1) Cell & Molecular Biology (2) Plant Biology		
Space Biology Cross-Element Discipline:	(1) Developmental Biology		
Space Biology Special Category:	None		
PI Email:	imara_perera@ncsu.edu	**Fax:**	FY 919-515-3436
PI Organization Type:	UNIVERSITY	**Phone:**	919-515-3544
Organization Name:	North Carolina State University		
PI Address 1:	Department of Botany		
PI Address 2:	Box 7612		
PI Web Page:	http://www.cals.ncsu.edu/		
City:	Raleigh	**State:**	NC
Zip Code:	27695	**Congressional District:**	4
Comments:			
Project Type:	Flight	**Solicitation / Funding Source:**	2014 Space Biology Flight NNH14ZTT001N
Start Date:	11/01/2014	**End Date:**	10/31/2017
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:	2	**Monitoring Center:**	NASA ARC
Contact Monitor:	Sato, Kevin	**Contact Phone:**	650-604-1104
Contact Email:	kevin.y.sato@nasa.gov		
Flight Program:	ISS		
Flight Assignment:			
Key Personnel Changes/Previous PI:	September 2015 report: Research Associate Eric Land.		
COI Name (Institution):			
Grant/Contract No.:	NNX15AB07G		
Performance Goal No.:			
Performance Goal Text:			
Task Description:	Plants are a vital part of human life support systems for long-duration space flight and habitation. However, the space environment is not optimal for plant growth. Plants grown in space are subject to many unfamiliar stresses (in addition to the lack of gravity) and recent transcriptional profiling studies indicate that there are global changes in gene expression between space and ground controls. Post transcriptional regulation of RNA is emerging as an important mechanism of modulating gene expression under different environmental conditions. To date however, there have been no studies to examine the role of small regulatory RNAs in plant responses to the space environment. We propose to examine the transcriptional and post transcriptional mechanisms that regulate early seedling development in space and microgravity. Our hypothesis is that plant adaptation and response to the space environment will involve novel regulatory small RNAs. Our previous flight experiment has revealed novel regulatory mechanisms and provides the foundation for further		

	investigation and the proposed research. The long term goals of this research are to understand the molecular mechanisms by which plants sense and adapt to changes in their environment and to characterize the regulatory networks that mediate these responses. This knowledge will be valuable for designing plants that are better able to withstand space flight, microgravity, and adverse environmental conditions. This project is in alignment with P2, one of the highest priority recommendations of the Space Biology Research focus on Plant and Microbial Biology as outlined in the Decadal Survey Report, “to analyze plant growth and physiological responses to the multiple stimuli encountered in space flight environments.”
Rationale for HRP Directed Research:	
Research Impact/Earth Benefits:	This research will have relevance and Earth benefits on many levels. On a practical level, we will optimize and develop protocols for efficient handling of limited experimental material that has application to many ground based studies. Most importantly, the knowledge gained from this work will provide a framework for designing and improving plants that are better adapted to adverse environments, which has potential benefit on Earth in the face of global climate change. In addition, this work will contribute towards enhancing education by providing ‘hands on’ training to undergraduate students in Science-Technology-Engineering-Math (STEM) programs.
Task Progress:	1. The major efforts these past few months have been with preparation for flight. To this end the Principal Investigator (PI) and research associate traveled to NASA Ames Research Center in May 2016 for the flight build. 2. Ground tests have been completed for seed storage with hydration at 2, 4, and 6 months after plating. Excellent germination and growth have been observed. 3. The Plant RNA Regulation (PRR) experiment passed the flight readiness review in July and was deployed to the International Space Station (ISS) on Space-X9, which launched on July 18, 2016. It is anticipated that the experiment will be conducted in Aug/Sept of 2016.
Bibliography Type:	Description: (Last Updated: 01/26/2024)
Significant Media Coverage	Hubscher B. (Interview with Dr. Imara Perera) "Space Station Live: How the Garden Grows in Zero G. Interview with Dr. Perera about the Plant RNA Regulation flight experiment." Space Station Live video, Published on Jul 28, 2016. https://www.youtube.com/watch?v=GiUvFpUK0ME , Jul-2016