PROYECT MUSA - COSTA RICA SECOND SPACE MISSION:

OPENING THE DOORS TO SCIENCE THROUGH MICROGRAVITY EXPERIMENTATION

In collaboration with

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A Disease Endangering 80% of Banana Plantations Worldwide

The Panama disease (also called Fusarium wilt) is a plant disease caused by the fungus Fusarium oxysporum f. sp. cubense (FOC), causing financial losses on banana crops around the world, including Asia, Africa, and America. This industry has an estimated worth of 1 billion USD anually. There is currently no know cure for this disease. The fungi can also stay dormant in the soil for up to 40 years [1].

Fusarium wilt. Source [1]

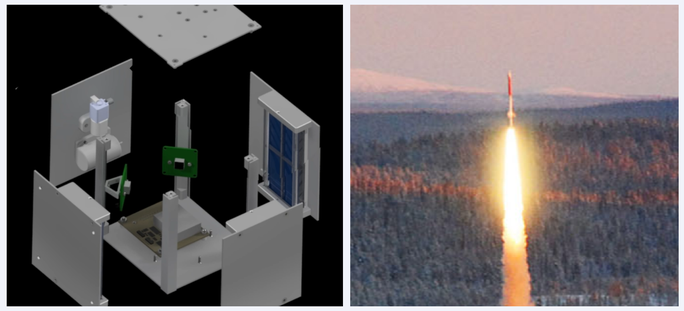
The Experiment to Find a Cure

Project MUSA is a microgravity experiment proposed to study the disease under microgravity conditions, using a dual fungi culture that will fly to the ISS in 2023. The structure will house the fungi samples, cameras, sensors and a flight computer to monitor conditions and send data back to Earth.

This project was born from a collaboration between the costarrican space startup Orbital Space Technologies (OST) and the Space Systems Laboratory (SETEC-Lab) and CIB from Costa Rica Institute of Technology. This will be Costa Rica's second space mission and first mission developed by a private company in the country. The project is funded through a crowfunding campaign in collaboration with the Central American Association for Aeronautics and Space, and generous support of other private companies such as Arroz Imperio, Liberty Empresas, and Nassar Abogados [2].

Experiment Hardware Validation

Hardware and capacities will be validated during a sub-orbital launch in november 2022, provided by Swedish Space Corporation, launching from Esrange Space Center in Sweden. This will provide valuable feedback to the team, and help further develop the technology and capacities needed for the ISS flight on 2023.



Modular hardware (left). SSC suborbital rocket (right). Source [4]

Opening Scientific and Business Opportunities in Latin America

OST seeks to develop innovative microgravity experimentation in the region. Allowing scientists and disruptors to access innovative microgravity solutions in the agro, industrial and pharmaceutical areas. OST will provide hardware development, technical expertise and logistics to its clients [4].

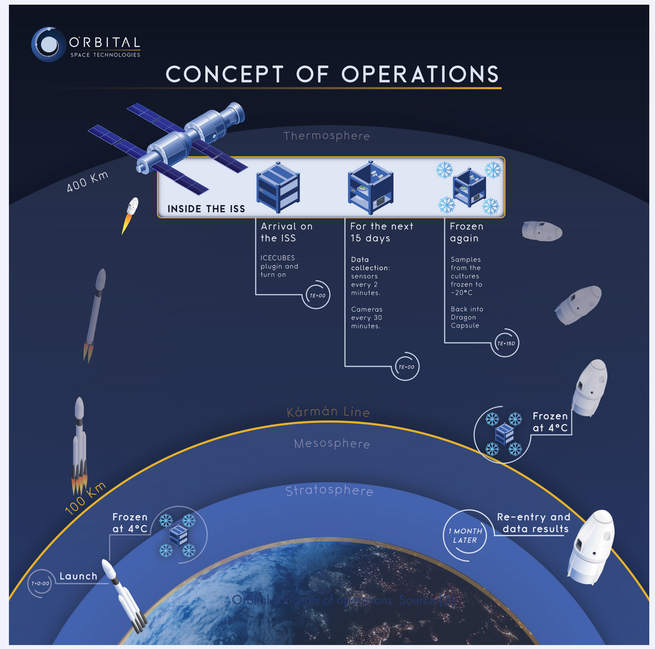
Suborbital flight article (left). MUSA Suborbital mission patch (right). Source [3]

Expected Results and Next Steps

With this sub-orbital flight we seek to validate all critical systems and develop more sofisticaded engineering and biological systems for Stage 2 of the experiment. Continuous development of modular and fast configurable hardware is the main goal, and will allow us to scale the number of experiments per year. After this we will also start a second crowfunding and sponsorship campaign to fund hardware and logistical costs.

Road to the ISS

After hardware and technology improvements have been completed, the next stage is flying the experiment to the International Space Station (ISS), after flying in a cold storage (4°C) the experiment will be connected to the station and remain in orbit for 15 days, before returning frozen back to Earth for sample retrieval and analysis.



References

- [1] Davis, Richard 2004. Fusarium wilt (Panama disease) of banana. Archived 2011-06-12 at the Wayback Machine Plant Protection Service.
- [2] La Nación 2022. Student startup will launch space mission in search for a cure. https://www.nacion.com/ciencia/startup-de-estudiantes-ticos-lanzara-mision/OWZZM4XVQFG2NN3BD3OIW7HNCY/story/
- [3] Orbital Space Technologies, 2022. Modular and reconfigurable hardware for microgravity experimentation. https://orbitalspace.tech/
- [4] Swedish Space Corporation, 2022. Flight Services and Technology. https://sscspace.com/

Learn more at https://orbitalspace.tech/