VEGGIE ON ICE: THE EFFECTS OF PLANT PRODUCTION ON HUMAN BEHAVIORAL HEALTH IN LONG-DURATION ANTARCTIC OVERWINTERING MISSIONS

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ABSTRACT

Exploration class missions pose an increased risk of adverse crew behavioral health and psychiatric conditions. Identifying and developing effective and efficient countermeasure strategies are necessary to maintain crew health and performance. Previous studies (VEG-04A and VEG-04B) in the Veggie vegetable-production system on the International Space Station have evaluated the behavioral health effects of caring for plants as a potential countermeasure for crew stresses in spaceflight. The presence of plants can augment sensory stimulation (visual, tactile, and olfactory), provide a psychological link to Earth, reduce stress, and increase happiness. However, further research is needed to understand this strategy for longer-duration missions in isolated, confined, extreme (ICE) environments. The Neumayer III Station in Antarctica is one such environment that hosts a small crew for fourteen-month missions, of which eight to nine months are the remote overwintering phase. Neumayer III also features EDEN ISS, a greenhouse facility with 12.5 m^2 plant cultivation space that, like Veggie, currently supplements the crew diet with a variety of fresh produce. Up to nine crew members of the 2021 overwintering mission will complete behavioral health surveys that are designed to capture enjoyment and time spent conducting various plant-related activities, sensory stimulation, and active and passive psychological effects of having live plants and available fresh food in an ICE environment. Data will be collected once pre-mission, up to ten times in-mission at monthly increments, and once post-mission. This study aims to quantify the impact of plant care as a countermeasure strategy for human spaceflight and Antarctic exploration missions.

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