

SUCCESSSES, CHALLENGES, AND DELICIOUS SURPRISES: LESSONS LEARNED FROM PLANTS GROWN IN EDEN ISS IN ANTARCTICA

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EDEN ISS was a plant production facility located near Germany's Neumayer Station III (NM-III) in Antarctica from 2018 until 2022. During this project, four overwintering teams, each comprised of 9 to 10 members, spent 14 to 15 months at NM-III, of which 9 to 11 months were in total isolation. The overwintering crews tested more than 60 cultivars of fruits, vegetables, and herbs in EDEN ISS, producing a grand total of over 1 metric ton of fresh edible biomass. EDEN ISS served as the sole source of fresh produce in this extreme and isolated environment, and the crops supplemented both the crew's diet and psychological health. Many of the cultivars grown in EDEN ISS were selected because they had been previously grown in crop production hardware on the International Space Station, but EDEN ISS also provided the novel opportunity to test cultivars and plant families that have not yet been tested in existing space hardware, particularly crops with larger volume requirements such as cucumber and kohlrabi. Crops were also grown concurrently and continuously in EDEN ISS during the isolation periods. In this paper, we report on the successes of these crops, horticultural and system challenges, and approaches to maintain crew interest in the plants and resulting produce throughout the mission. It is our hope that the data, crew feedback, and lessons learned from EDEN ISS can be used to make better informed decisions on the design and operations of a large-scale crop production facility for missions on the Moon and Mars.