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AN ANALOG MARS MISSION TO EXPERIMENT AND DEVELOP NEW TECHNIQUES FOR
MANNED MISSIONS

Abstract

Planet Mars being closest to Earth with an environment suitable for some forms of life to exist, the concept of terraforming Mars is one of the most ambitious projects of the Space Agencies like NASA, ESA, CNSA and private industries like SpaceX. Several successful missions to Mars as orbiters, probes, rovers to study the planet surface, its atmosphere has given good understanding of the planet. In order to carry out successful manned missions to Mars, humans will have to develop key tactics to cope up extreme conditions, confined spaces and limited resources.

The Mars Desert Research Station (MDRS) by Mars Society a full-scale Mars analog facility in Utah, USA is one among the five research stations set up that supports Earth-based research in pursuit of the technology, operations, and science required for human space exploration. This paper focuses on the experiments carried out by team Planeteers (Crew 174) on an analog Mars Mission. The experiments include observation of the effect of Vitamin D on plant growth. The experiment aimed to develop sustainable methods to grow edible crops on Mars. Keeping in mind the health of the astronaut, multiple factors were considered while choosing the crop to be experimented such as nutritional value, growth rate, soil texture needed for the crop etc. Experiment was conducted with soils collected from different regions of the analog site and the Earth soil. Growth of the plant was observed in green hab and under controlled light and humidity when supplied with Vitamin D rich water and results were tabulated. Protocols were developed to minimize the spread on Human bacteria on the Martian environment and samples were collected from inside and outside the hab through zoning technique to carry out research on the bacteria spread. Tests were conducted to know the use of a drone (unmanned vehicle) by taking pictures of terrain ahead, search for lost a crew member and photograph unsafe regions on analog Mars during EVA's. The paper will also present the challenges, time management, human factors and the lessons learnt during the mission.