

Challenges of Life Support/Medical Support for Human Missions (8)  
Challenges of Life Support/Medical Support for Human Missions (2) (2)

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ANALYSIS OF PLANT MORPHOLOGY AND PHYLOGENETICS OF INDIGENOUS PLANTS AS A  
SOURCE OF FOOD, OXYGEN AND MEDICINAL PURPOSES FOR SPACE APPLICATIONS

**Abstract**

Space exploration has been the unrequited dream of mankind since ages. With increasing interest and curiosity to make mankind a successful interplanetary species, Mars can be the first step taken towards it. Knowing Mars can help us know more about Earth's geologic time scale and the origin of life. In order to do that, development of novel technologies and fusion of multiple fields with respect to space habitat establishment have to be under-taken. This research concentrates on blending the many essential fields of natural sciences on an astrobiological and geological perspective to create a successful self-sustaining bio-regenerative life support system on a Mars habitat that focuses on indigenous plant varieties that require minimal energy, water, nutrients and waste production. A Mars habitat's self sustenance on a large scale depends on the greenhouse for food and oxygen production. Plant growth in a Mars habitat is taken care of by astronauts in a rotational manner, it means that the rearing and caring of plants can be done by any person with the understanding of plant needs. The plants which are used in this research are simple in terms of growth requirements and take less time for producing food from them and also serve for recreational purposes that aid in the psychological needs of the astronauts. The bioavailability of Martian regolith suits better for plants with less nutrient uptake and energy requirement. With the inclusion of plant varieties from different geographical backgrounds and climatic conditions, the range of plants used for food production and oxygen generation can be increased manifold. Indigenous plants like *Nigella sativa* (Black cumin), *Bocconia cordata* (Plume Poppy), and *Melocactus zehntneri* (Brazilian cactus Coroa de Frade/Priest Crown) are some examples of plants which grow in extreme climatic conditions where there is water scarcity or less nutrient availability. But these plants successfully make use of the conditions present to grow efficiently and also contain medicinal properties that aid in human physiology. Extending research on plant varieties that are versatile can pay off for a successful self-sustaining habitat on Mars and also paves way to preparation of medicines in a closed habitat.