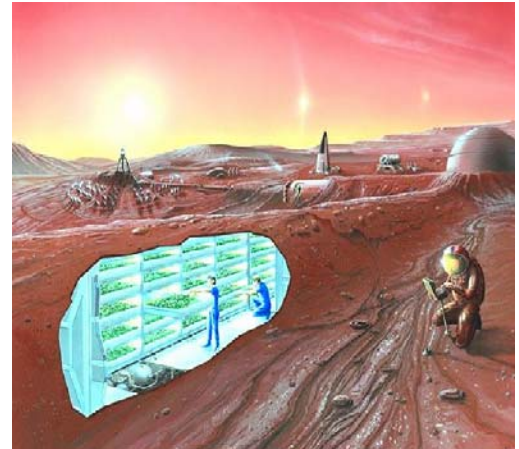


TERRI LOMAX, Oregon State University

Developing a Plant Genetic Assessment and Control System for Space Environments

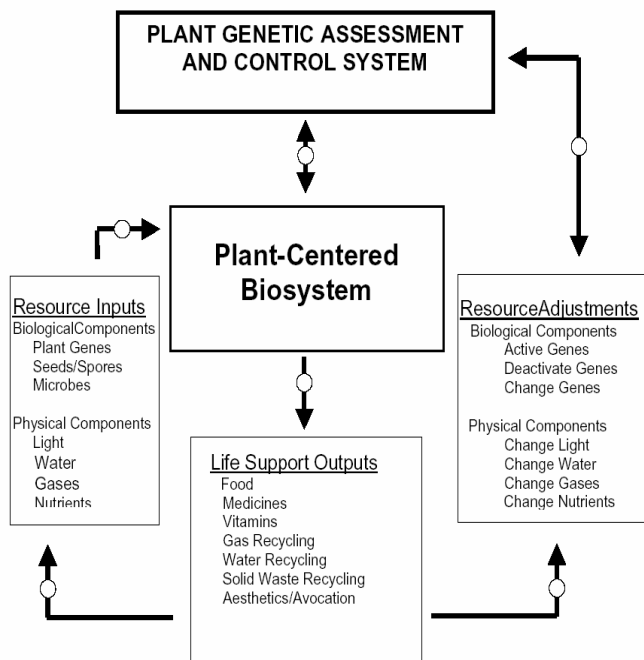
Plants will play an essential role in providing life-support for any long-term space exploration or habitation. This proposal describes an adaptable system that measures the response of plants to any unique space condition and then optimizes plant performance under those conditions. The proposed architecture is based on a unique combination of systems including the rapid advances in the field of plant genomics, micro array technology for measuring gene expression, bioinformatics, and physiological monitoring. The resulting flexible module for monitoring and optimizing plant responses will play an integral, cross-cutting role in achieving the goals of several NASA Strategic Enterprises including Human Exploration and Development of Space, Biological and Physical Research, and Space Science.



In Phase II, we will assess the capacity for applying the results from future plant functional genomics projects to those plant species most likely to be used in space environments. Eventually, it will be possible to use this architecture to optimize the performance of any plant in any space environment. In addition to allowing the effective control of environmental parameters for enhanced plant productivity and other life support functions, the module will also allow the selection or engineering of plants optimized to thrive in specific space environments. Future additions to the architecture will include the technical

Role of Plant Genetic Assessment and Control

advances necessary for remote collection and evaluation of data. In Phase II, we will study the major feasibility issues associated with cost, performance, development time, and key technology issues for developing a Plant Genetic Assessment and Control System to provide a sound basis for NASA to consider implementation of the concept for future missions. The proposed concept will advance NASA's mission of human exploration, use, and development of space in the near- and mid-term on the International Space Station and in the far-term for longer duration missions and eventual space habitation.



Role of Plant Genetic Assessment and Control System in a Plant Centered Life Support System. Circles show control joints.